American Machinist

September 11, 1935

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Machine Tool Show
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American Machinist's Machine Tool Show number is edited particularly to tell of the new equipment on display this week and next at the Cleveland Public Auditorium. Readers who have the good fortune to attend the Show will find in it a convenient guide in locating companies, representatives and exhibits they may wish to visit.

Those unable to be present will obtain an excellent picture of what the Show has to offer from "The Show in Print". All the equipment shown in this section is of new design. In addition many of the booths contain older machines that have already been described in this paper.

Some manufacturers are displaying new equipment, descriptions of which did not reach us in time to include in this number. Such items will be fully presented in future numbers until each reader has in his hands a complete record of the latest developments in machine shop equipment.

Here it is!
Your
"Machine Tool Show in Print"

Use this issue to *plan* your visit to the Show. It will save you time. It will insure against overlooking some equipment of importance to you.

Study the advertising to select the equipment which offers the best profit-opportunities in your plant. Make a list of that equipment, with manufacturer's name and booth number. Mark on the floor plan in this issue the booths you particularly want to inspect. The issue then is your practical guide to the Show,—conserving your time, giving you a pre-view of important exhibits, insuring you against missing something you ought to see.

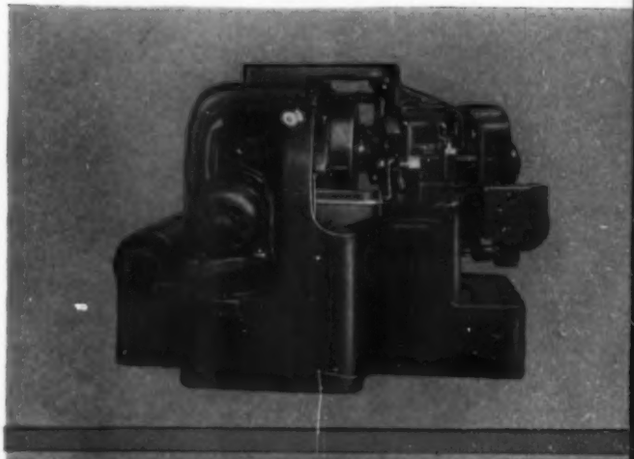
If you can't get to Cleveland, this issue will give you "the next best thing." Read it, preserve it, as a broad and thorough presentation of "The World's Most Modern Machine Shop"—the 1935 Machine Tool Show.

To all its readers who attend this great exposition, American Machinist extends a hearty and cordial invitation to visit us in our Booth Number A-7. You'll find it just inside the main entrance. We'll be happy to be of any service to you.

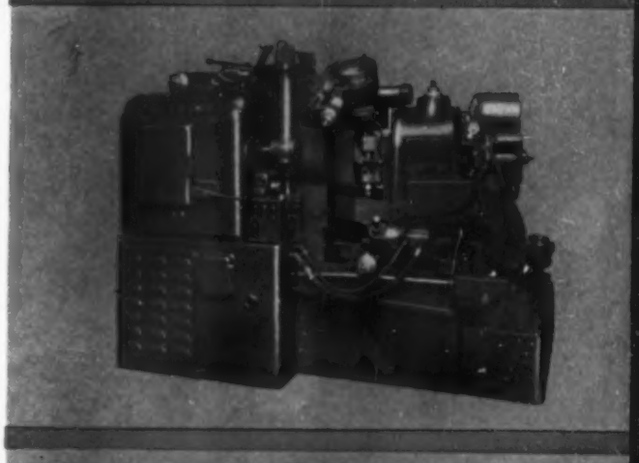
Betterments that far outweigh your investment in *New* GLEASON BEVEL GEAR MACHINERY

Daily at the Gleason Booth we are demonstrating new equipment and methods that will quickly pay for themselves on modern production lines.

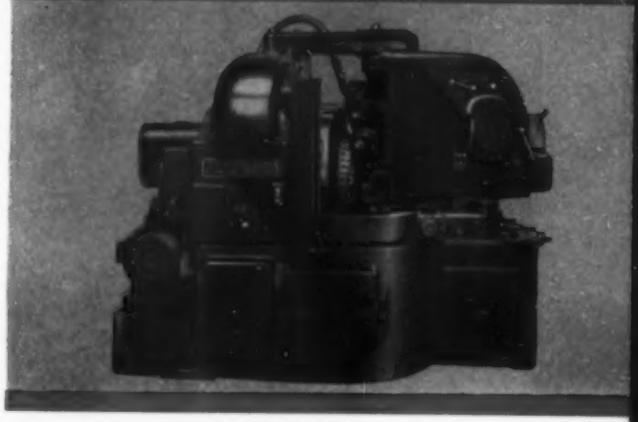
The No. 11 Single Cycle Gear Finishing Machine employs the fastest method yet devised for finish cutting spiral bevel and hypoid gears. Speed and quality are the highest yet achieved for this class of work.



The No. 14 Spiral Bevel and Hypoid Gear Grinder is an entirely new machine overcoming the difficulties due to deformation in heat treating spiral bevel and hypoid gears by permitting grinding after hardening to closest limits.



The New Gleason No. 15 Spiral Bevel Pinion Rougher rough cuts two to three times as many pinions as the superseded model. Stock is removed more uniformly and closer to the finish size of tooth. Cutter life is greatly increased.



But, that is only a small part of the story Gleason has to tell this year. Plan to visit our exhibit. Booth 811.

GLEASON WORKS
ROCHESTER, N. Y., U. S. A.

AIRCRAFT and

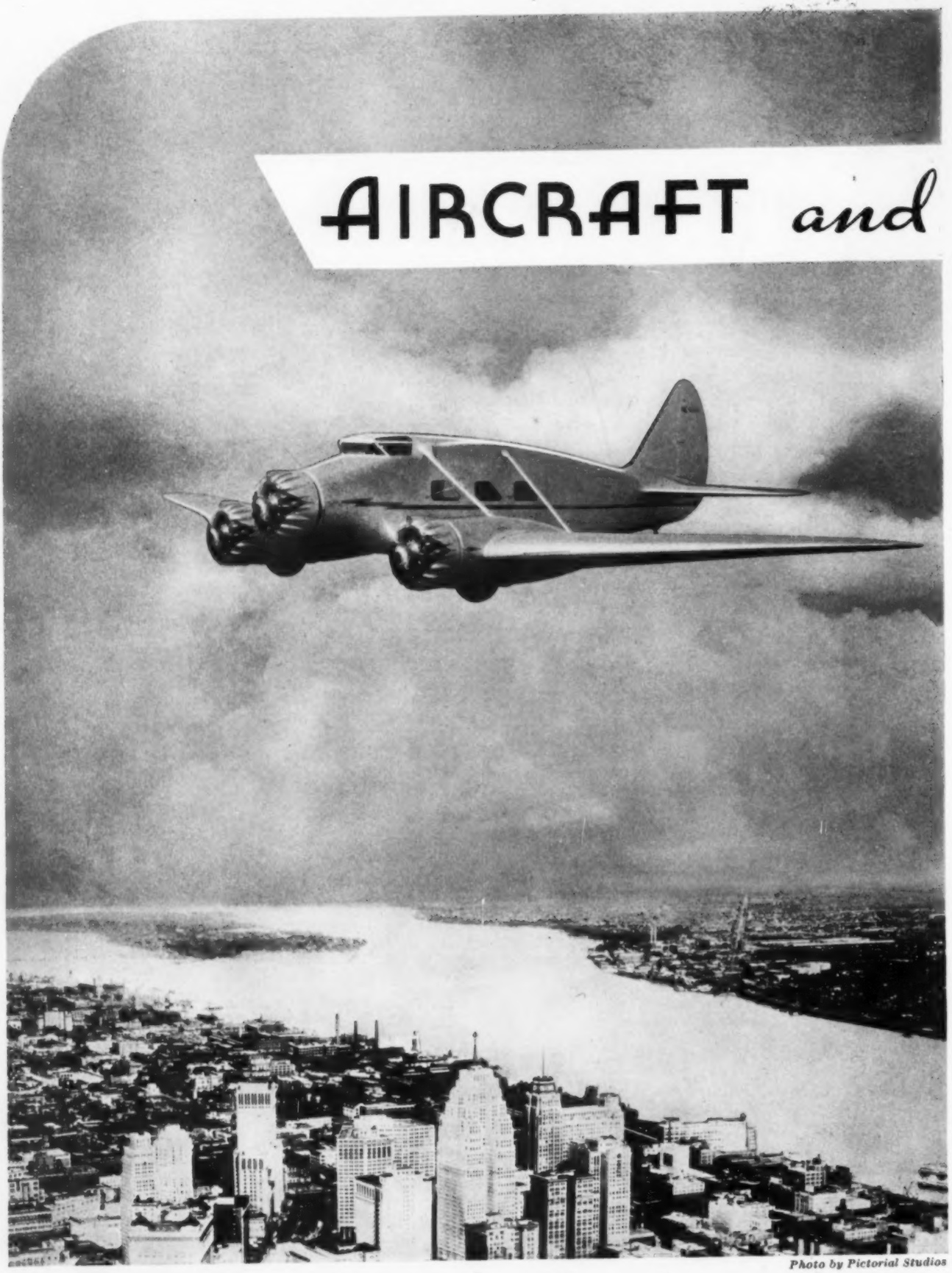


Photo by Pictorial Studios

Visit us in Cincinnati..

Lodqe & Shipley Lathes

When you watch one of the modern ships gracefully leave the ground to start its course skyward you just can't help being thrilled.

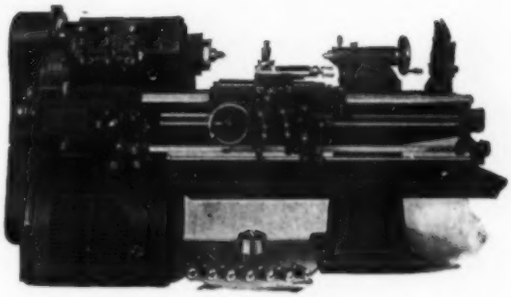
To the aviator, it is a business — to the average onlooker, an adventure but to the mechanic, a concrete example of mechanical perfection.

Just think of it — by far the largest majority of planes built in the United States have motor parts machined on Lodge & Shipley lathes.

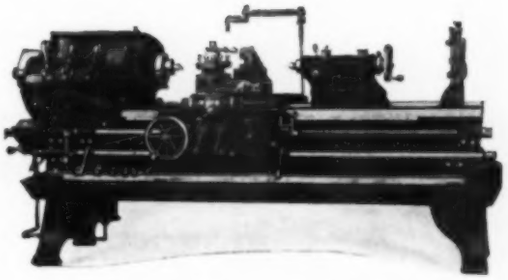
Again the mechanic sees a definite picture — extremely low tolerances, dependable accuracy — ease of operation — lower cost production — these and other things have gained wide acceptance for Lodge & Shipley, not only in the aeroplane industry but in all industries.

VISIT OUR EXHIBIT — BOOTH NO. 1018
AT THE
MACHINE TOOL SHOW IN CLEVELAND
SEPTEMBER 11-21

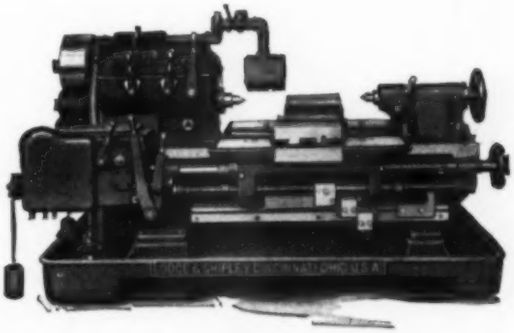
LATHES *Good* LATHES ONLY!



Tool Room Lathes



Manufacturing Lathes



Duomatic Lathes

THE LODGE & SHIPLEY MACHINE TOOL CO.

A PREVIEW OF

CINCINNATI

23 Machines

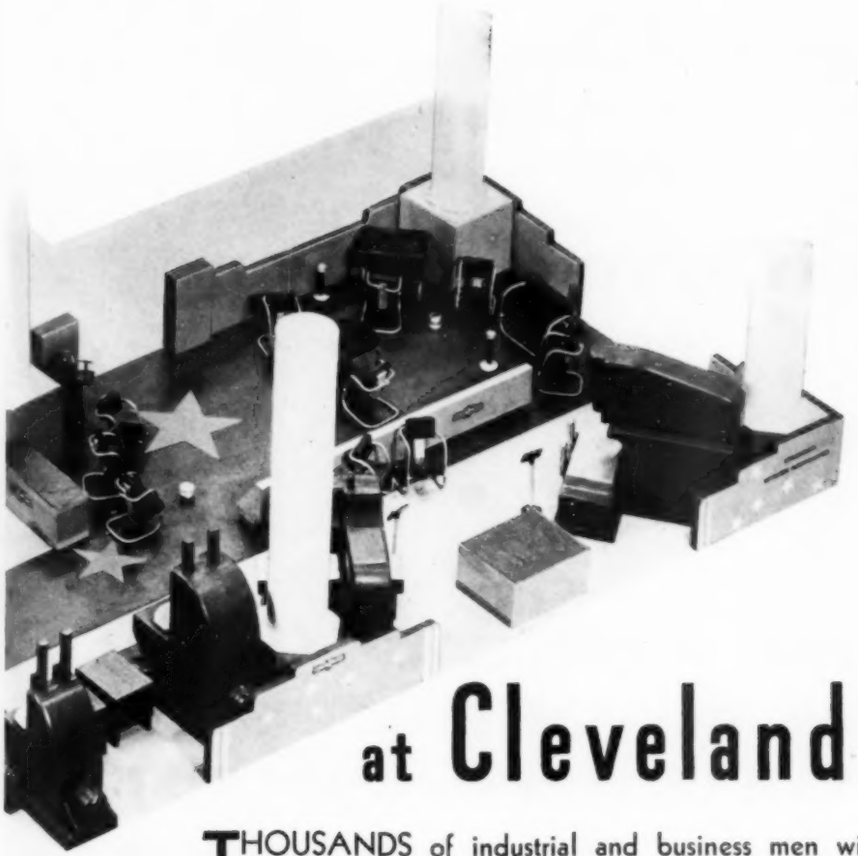
BOOTH 207

Nos. 2 Plain, Universal and Vertical High Speed Dial Type Milling Machines . . . No. 3 Plain Medium Speed Dial Type with Motor Driven Universal Overarm Attachment . . . No. 2 Universal L type Milling Machine . . . Two No. 1-12 Plain Automatic Milling Machines . . . Nos. 3-24, 4-48 and 5-48 Plain Hydromatics . . . 45-60 Three-Spindle Hydromatic . . . No. 2 Cutter and Tool Grinder . . . 6" x 30" Plain Hydraulic . . . 12" x 72" Universal Self-Contained Grinding Machine . . . 24" x 144" Roll Grinding Machine . . . Chucking Grinder . . . Two No. 2 Centerless Grinders . . . No. 3 Centerless Grinder . . . Centerless Lapper . . . Nos. 2-36 and 5-42 Hydro-Broach Machines . . . Hydro-Diematic . . .

A 5 STAR SHOW

September 11th to 21st

inclusive



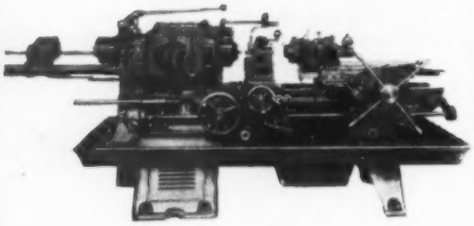
at Cleveland

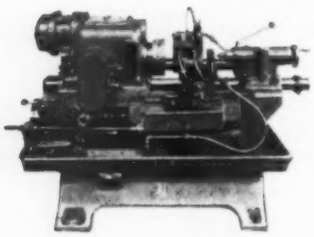
THOUSANDS of industrial and business men will see 23 modern Cincinnati Machines in Booth 207 during the Machine Tool Show. They will see an unusual display of cost-cutting machines representing five fields of manufacturing methods illustrated in this "Preview of a 5 Star Show." They will see the newest-new in milling, grinding, lapping, broaching and die-sinking. They'll discover new possibilities in cost reduction, accuracy, productivity, ease and convenience of operation! They'll see a 5 Star Show!

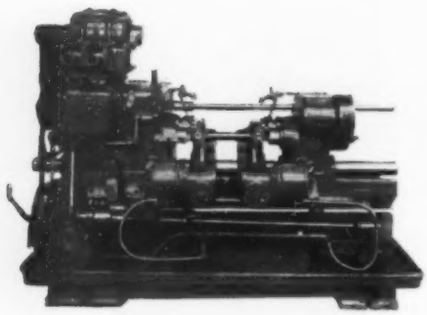
Plan now to join them. Use this "Preview" as a guide in our exhibit Booth 207.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI GRINDERS INCORPORATED
CINCINNATI, OHIO, U.S.A.

JONES & LAMSON EXHIBIT







A few of our many machines at the show.

TURRET LATHES

A new line of Ram Type and Saddle Type Machines running on actual jobs.

●

FAY AUTOMATIC LATHES

See the various sizes in operation.

●

THE AUTOMATIC DOUBLE-END MILLING AND CENTERING MACHINE

Milling to length and centering to uniform depth both ends of a piece in one machine cycle.

A Show Don't

JONES & LAMSON

SPRINGFIELD,

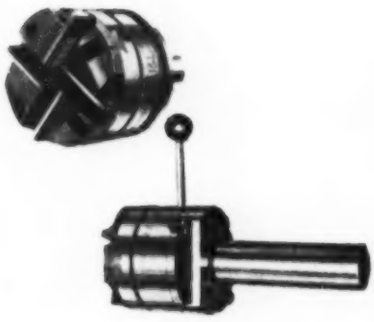
AT THE CLEVELAND SHOW

COMPARATOR AND MEASURING MACHINE, BENCH TYPE COMPARATOR

and other types, featuring the J&L Universal Inspection System—of inestimable value for inspecting a large variety of Tools, Gages and Products.

AUTOMATIC SCREW THREAD DIES— TANGENT AND RADIAL

A full line of thread cutting tools—Rapid, Accurate and Long Lived.

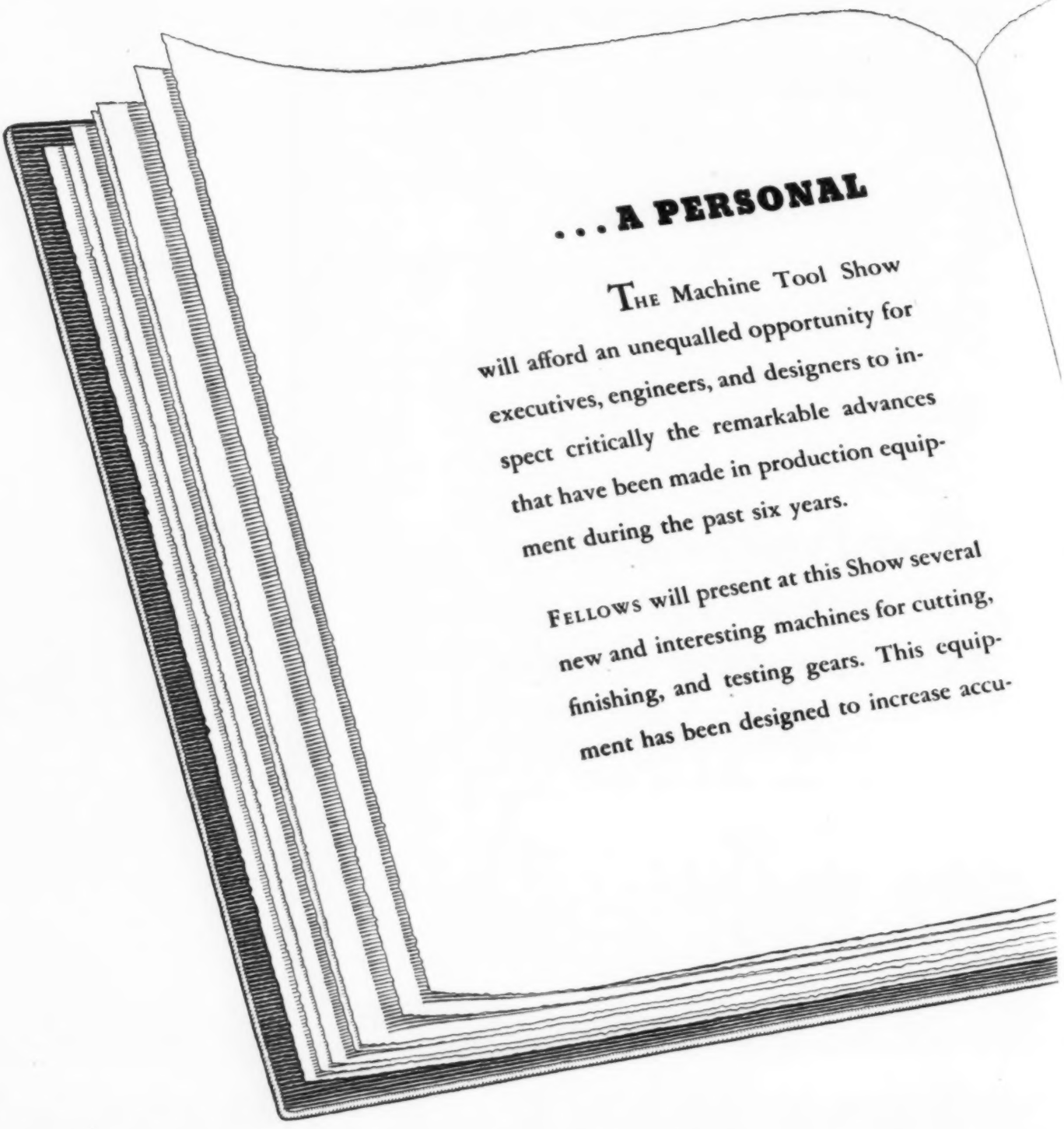


Just a sample of our small tool exhibit.

in Itself Miss It

MACHINE COMPANY

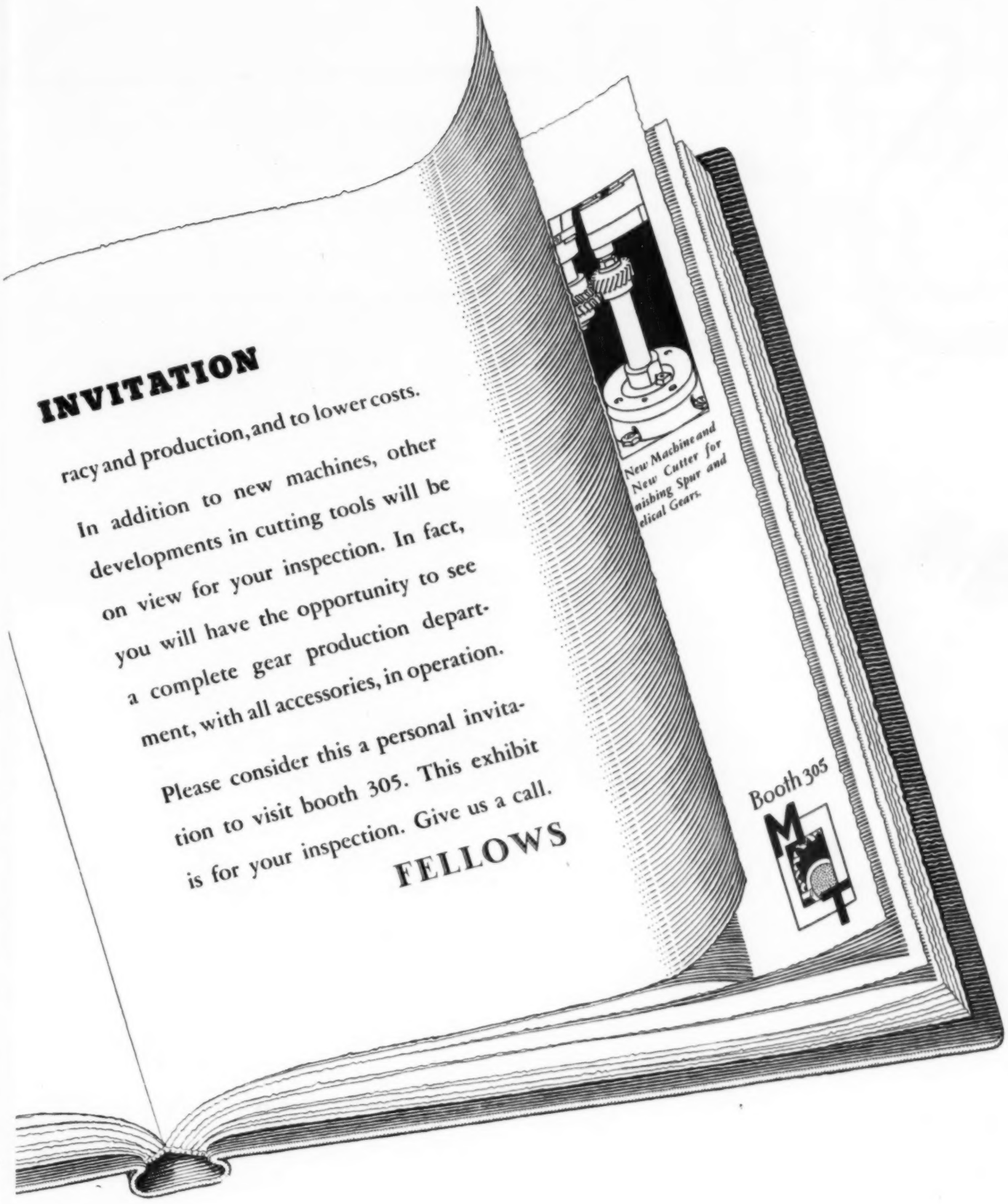
VERMONT, U. S. A.



. . . A PERSONAL

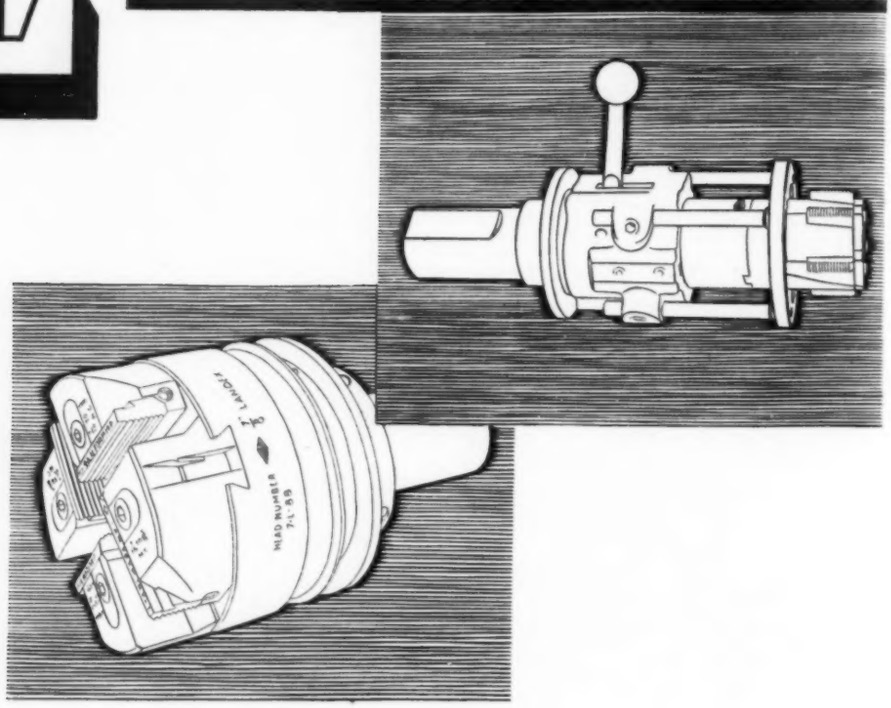
THE Machine Tool Show will afford an unequalled opportunity for executives, engineers, and designers to inspect critically the remarkable advances that have been made in production equipment during the past six years.

FELLOWS will present at this Show several new and interesting machines for cutting, finishing, and testing gears. This equipment has been designed to increase accu-


INVITATION
racy and production, and to lower costs.
In addition to new machines, other developments in cutting tools will be on view for your inspection. In fact, you will have the opportunity to see a complete gear production department, with all accessories, in operation.
Please consider this a personal invitation to visit booth 305. This exhibit is for your inspection. Give us a call.
FELLOWS
New Machine and New Cutter for nishing Spur and elical Gears.
Booth 305

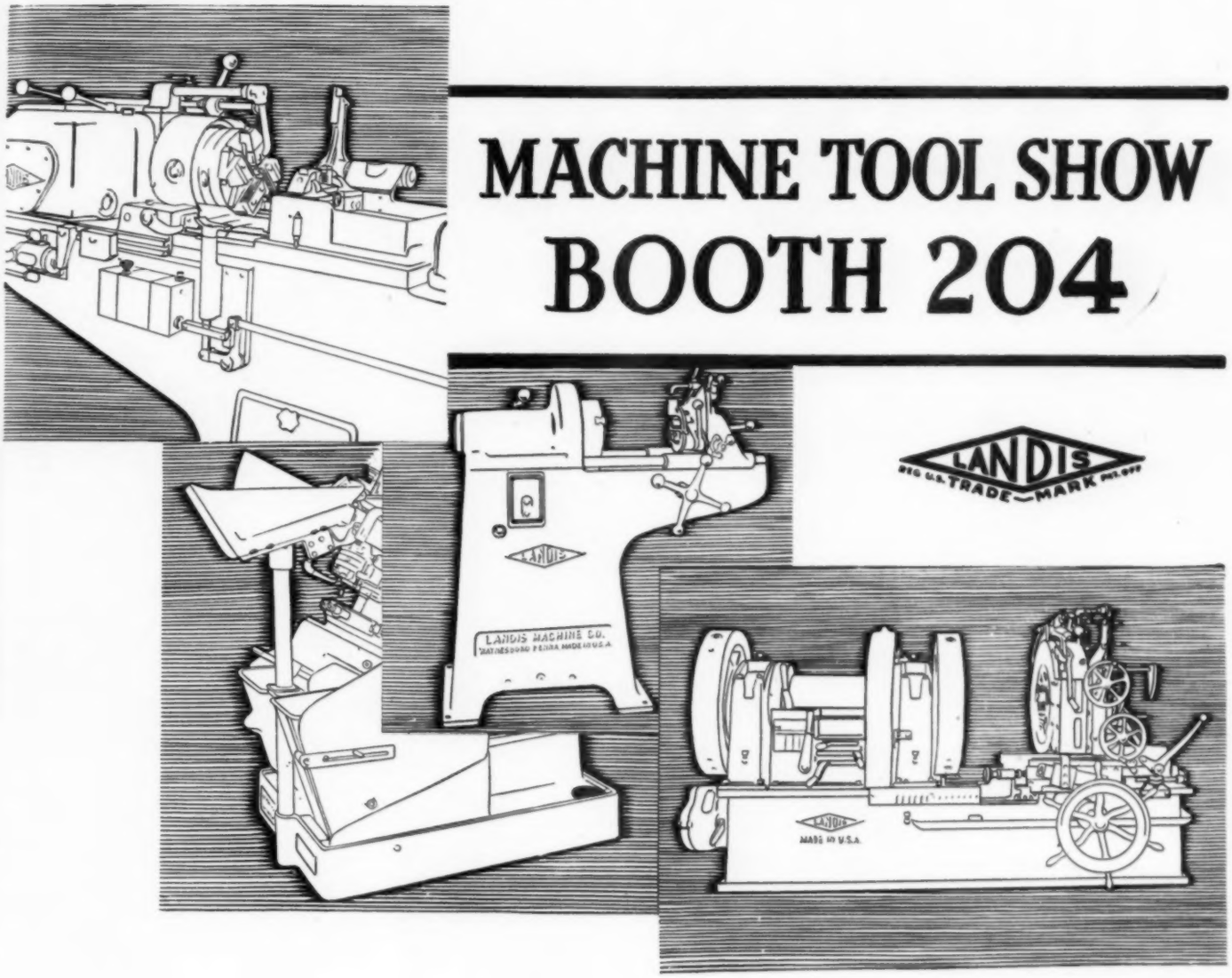
SEE

The most complete display
of
modern thread cutting equipment
in operation



Thread Cutting Machines, Die Heads, and Collapsible Taps for every threading requirement.

LANDIS MACHINE COMPANY, INC.
Waynesboro, Penna., U.S.A.



MACHINE TOOL SHOW
BOOTH 204

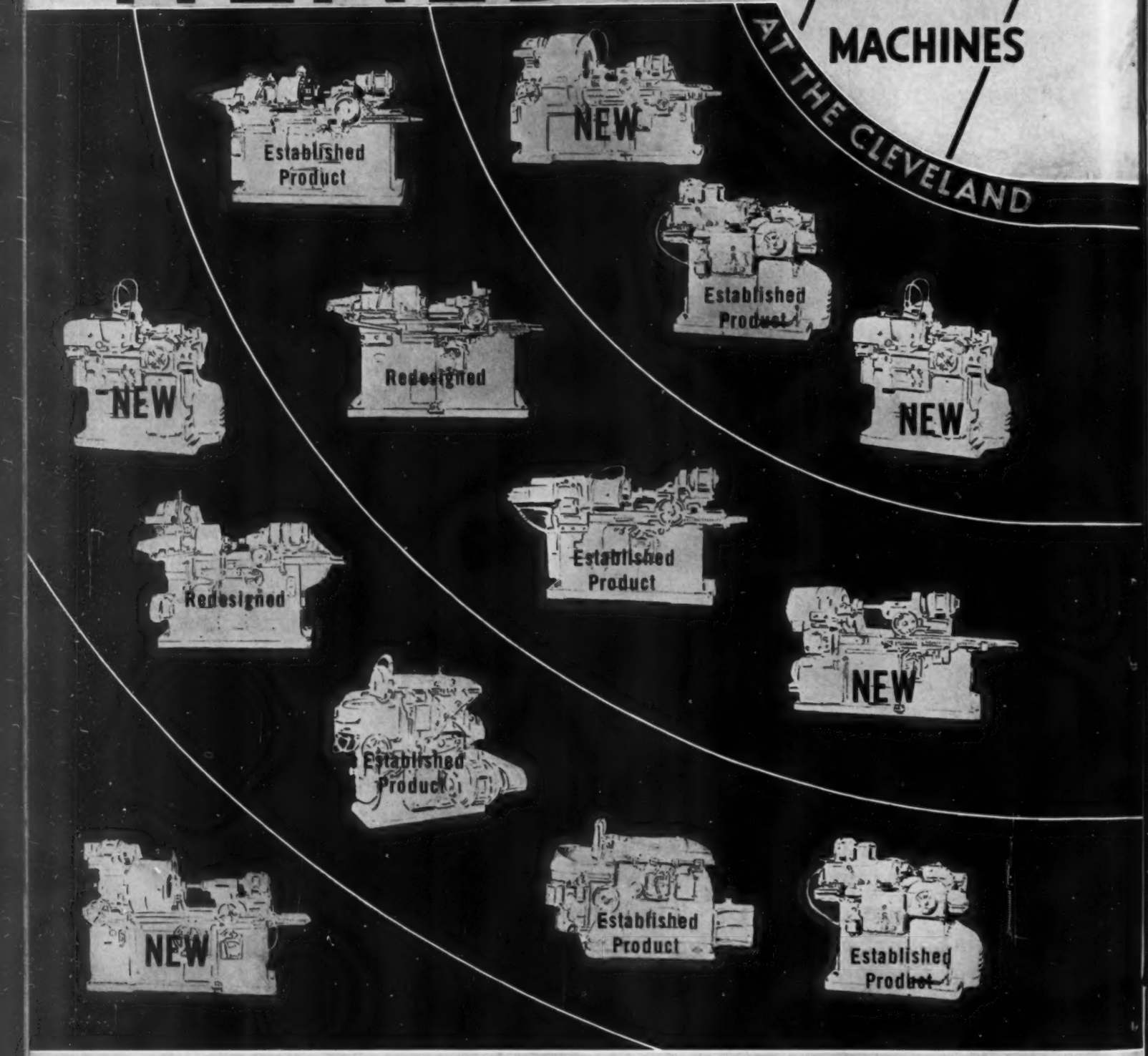
You will find the solution to your threading problems in Booth 204 at the Machine Tool Show. Here, in actual operation will be modern threading machines designed for every type of threading, and every requirement, whether maintenance or production. Here, too, will be shown the complete line of LANDIS Threading Tools, including the new Hardened and Ground Die Heads and the new Collapsible and Receding Chaser Taps.

Visit our exhibit and see the most complete display of thread cutting equipment. Have us demonstrate the features and the operation of these modern thread cutting tools.

HEALD

PRECISION *Grinding* MACHINES

AT THE CLEVELAND



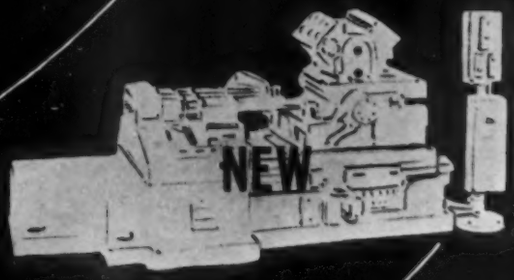
At Cleveland, we will exhibit 22 machines in actual operation on regular production work. Ten are brand new and have never been exhibited before. They include a Gap Internal for work needing large swing • An Internal for handling work larger than our standard No. 72's • Centerless Internal Grinding Machines • A Precision Boring Machine specially designed for facing and grooving • A Bore-Matic for

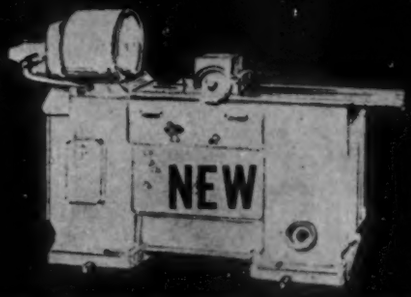
THE HEALD MACHINE COMPANY,

PRECISION *Boring* MACHINES

HEALD

SHOW BOOTH 206



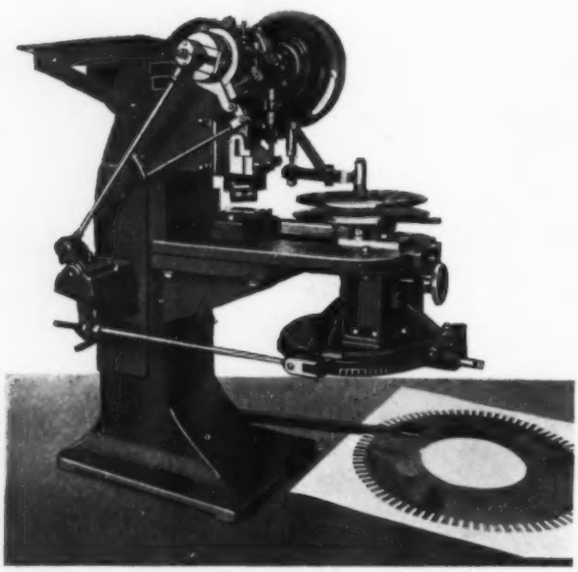


precision boring automobile cylinders and other large castings • A new small double-end Bore-Matic • Also a new single-end Bore-Matic for manufacturers with small production. Four of the 22 have been completely redesigned and much improved. The balance are proven products operating satisfactorily in hundreds of shops. See this outstanding exhibit, with many new products of the most modern design!

Worcester, Massachusetts, U. S. A.

You are cordially invited to inspect the
GREATER SPEED and NEW ACCURACY of
V & O PRESSES in operation
at the Cleveland Show Booth E-315

The improved V & O 410
HIGH SPEED NOTCHING PRESS



SEE motor laminations notched in this our most recent development.

Note the advanced features in design—sturdy construction—positive smooth-acting clutch—fully releasable brake, engaged only when clutch is released—the precision with which punch and die register—easy operation and adjustment of indexing mechanism—large diameter index rings—long wear and accurate spacing index pawl.

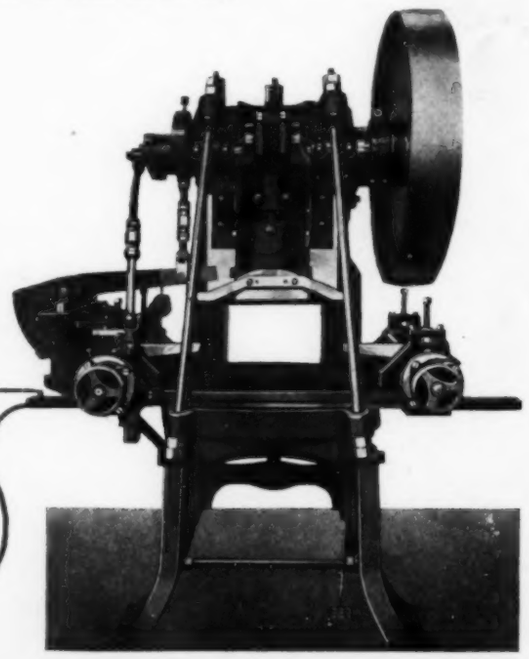
Ask us to put this PRESS through its paces.

STANDARD INCLINABLE TYPE V & O PRESSES

THE one you'll see at Cleveland is a standard No. 3½ unit—one of 21 sizes (ranging from 3 to 100 tons capacity). See it in operation—with Roll Feed, Scrap Cutter, Stock Reel, Dies, etc.

Note the long slide ways for accurate alignment, greater die life and double production between grinds. Inspect the sturdy, forged eccentric type shaft—husky 45° angle bearings—positive stop—easily adjusted inclining mechanism—hardened driving and backing pins in flywheel.

Discuss your die and press work problems with us freely.



The V & O PRESS COMPANY, Hudson, New York

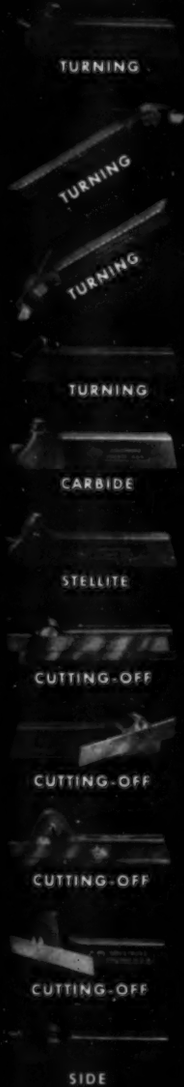
SALES AGENTS

Henry Prentiss & Co., New York—Hartford—Boston
—Syracuse—Buffalo
Burdett & Burchart Machinery Co., Chicago—
Milwaukee
George L. Lind, Bourse Bldg., Philadelphia
Milholland Sales & Machine Co., Indianapolis
Wm. K. Stamets, Jenkins Arcade Bldg., Pittsburgh
Adams-Jackson Machine Tool Co., Toronto, Canada

ARMSTRONG
TOOL HOLDERS
Save All Forging 70% Grinding, 90% High Speed Steel

The ARMSTRONG System of Tool Holders

Provides permanent multi-purpose tools for every operation on lathes, planers, slotters and shapers.



The Actual Cutting will still be done by the Cutter and the efficiency of the machine-tool will be governed by its

ARMSTRONG TOOL HOLDER

BUY the most modern machine-tools, the latest lathes, planers, slotters and shapers, the newest developments in turret lathe and screw machines . . . then equip each with *modern* ARMSTRONG TOOL HOLDERS for greatest efficiency.

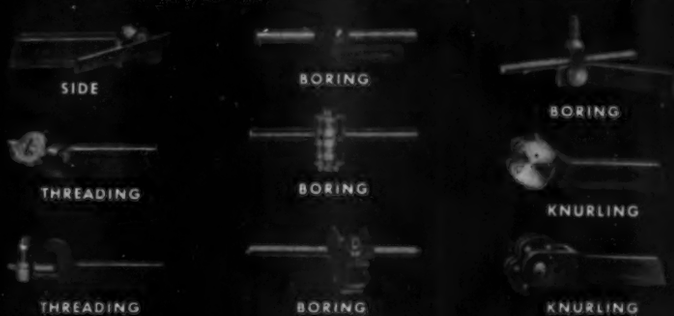
ON any metal-cutting machine tool, the actual cutting will be done by the cutter and its performance governed by its Tool Holder. Paralleling the advance in machine tool design, are advances in the Armstrong System of Tool Holders — new ARMSTRONG TOOL HOLDERS that cut cutting-costs and build profits.

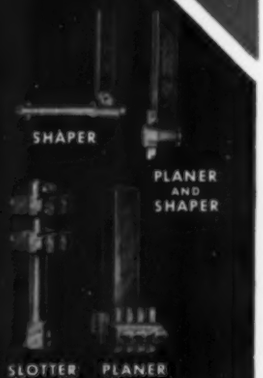
Write for Catalog B-35

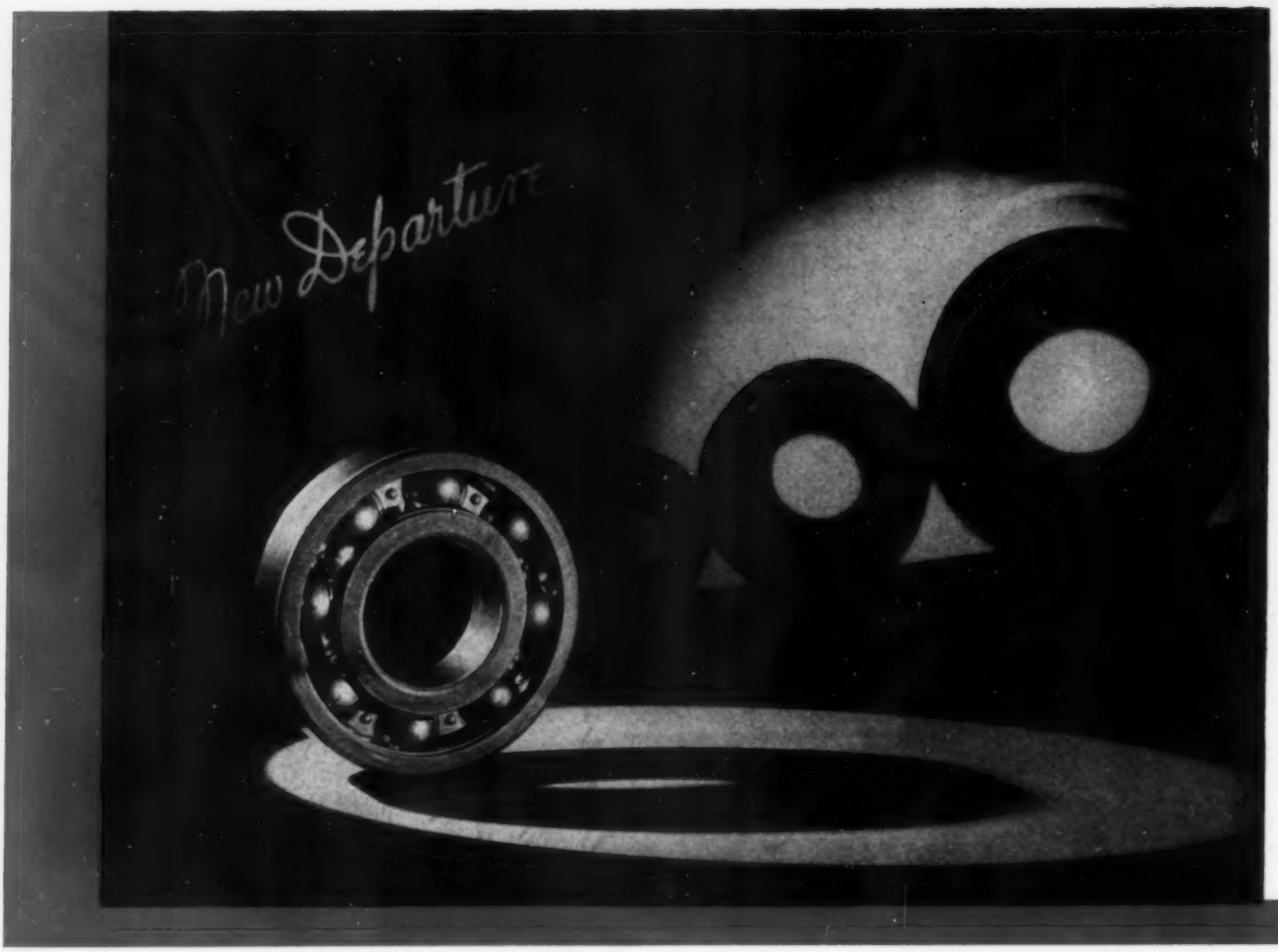
See the *Modern* ARMSTRONG TOOL HOLDERS at the MACHINE TOOL SHOW, Booth A-304 CLEVELAND, Sept. 10th to 21st.

ARMSTRONG BROS. TOOL CO.
"The Tool Holder People"
315 N. Francisco Ave., Chicago, U. S. A.
New York Sales Office: 109 Lafayette Street.
San Francisco Sales Office: 661 Folsom Ave.
London Branch: ARMSTRONG BROS. TOOL CO., LTD.

ARMSTRONG
TURRET LATHE AND SCREW MACHINE TOOLS







BALL BEARING IDEAS . . .

by New Departure Engineers

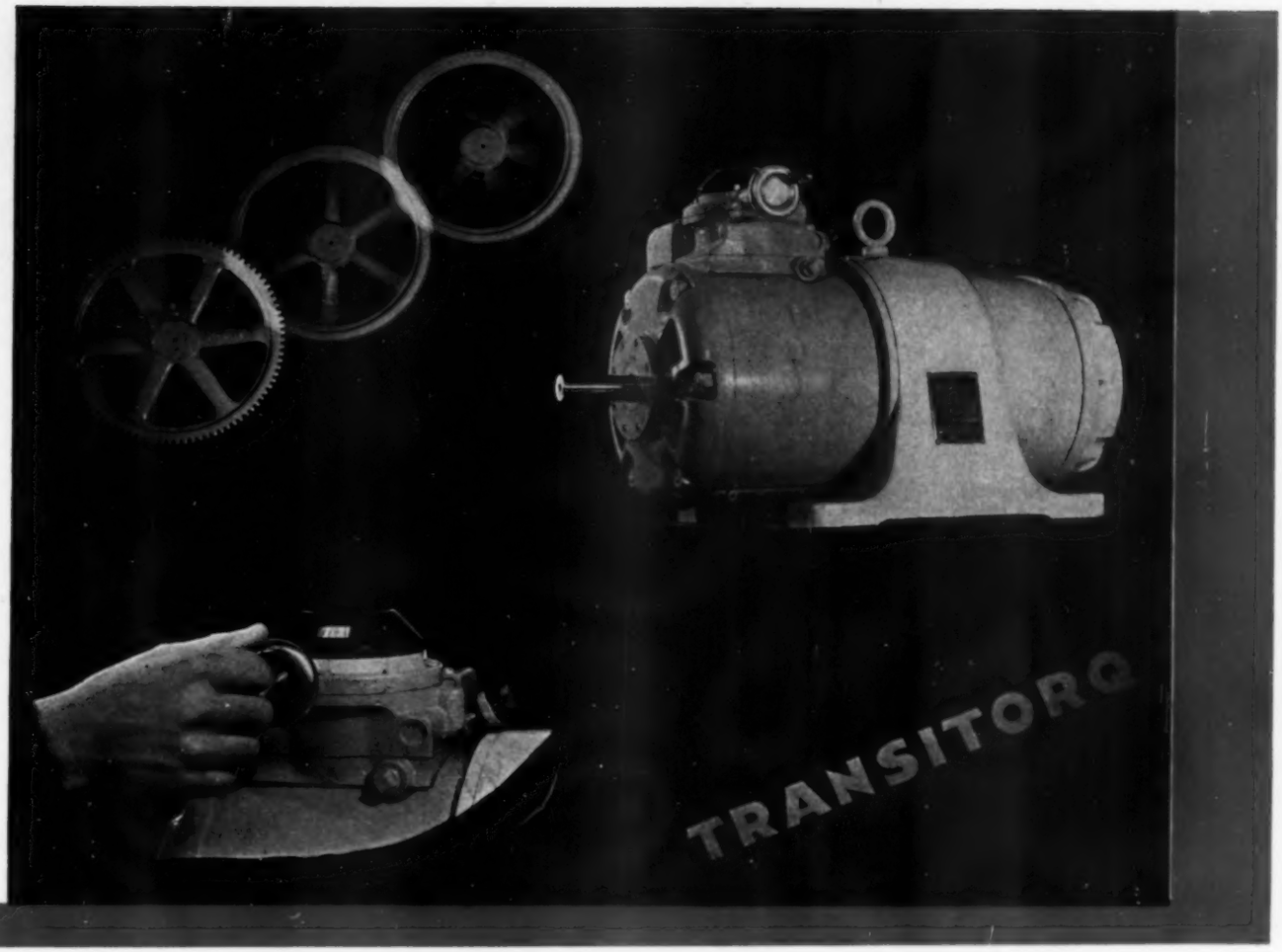
TO use the best ball bearing obtainable does not alone assure the utmost in bearing performance. The installation must be backed by ceaseless research, experience and *ideas.*

New Departure engineers have the faculty of applying to a given job installation *ideas* that often suggest means of cutting manufacturing costs as well as improving bearing and machine performance.

Examples of such work form the subject of a booklet that will be distributed in the New Departure space (E-406) at the Machine Tool Show. If you do not have an opportunity to visit us at Cleveland, we will gladly mail you a copy of this booklet, "Ball Bearing Ideas by New Departure Engineers."

The New Departure Manufacturing Company, Bristol, Conn. Branches at Detroit, Chicago, San Francisco and London, England.

NEW DEPARTURE
BALL BEARINGS



THOUSANDS OF SPEEDS . . .

at the touch of a finger

NOW, for the first time, *infinite* speed change becomes available at the touch of a finger — the flash of a light — or the passing of time.

Not only is the Transitorq a transmission whose speed is *infinitely adjustable* over a wide range — but its marvelous ease of speed control — immediate or remote, manual or automatic — presages a revolutionary advancement in increased production and lower costs in every industry.

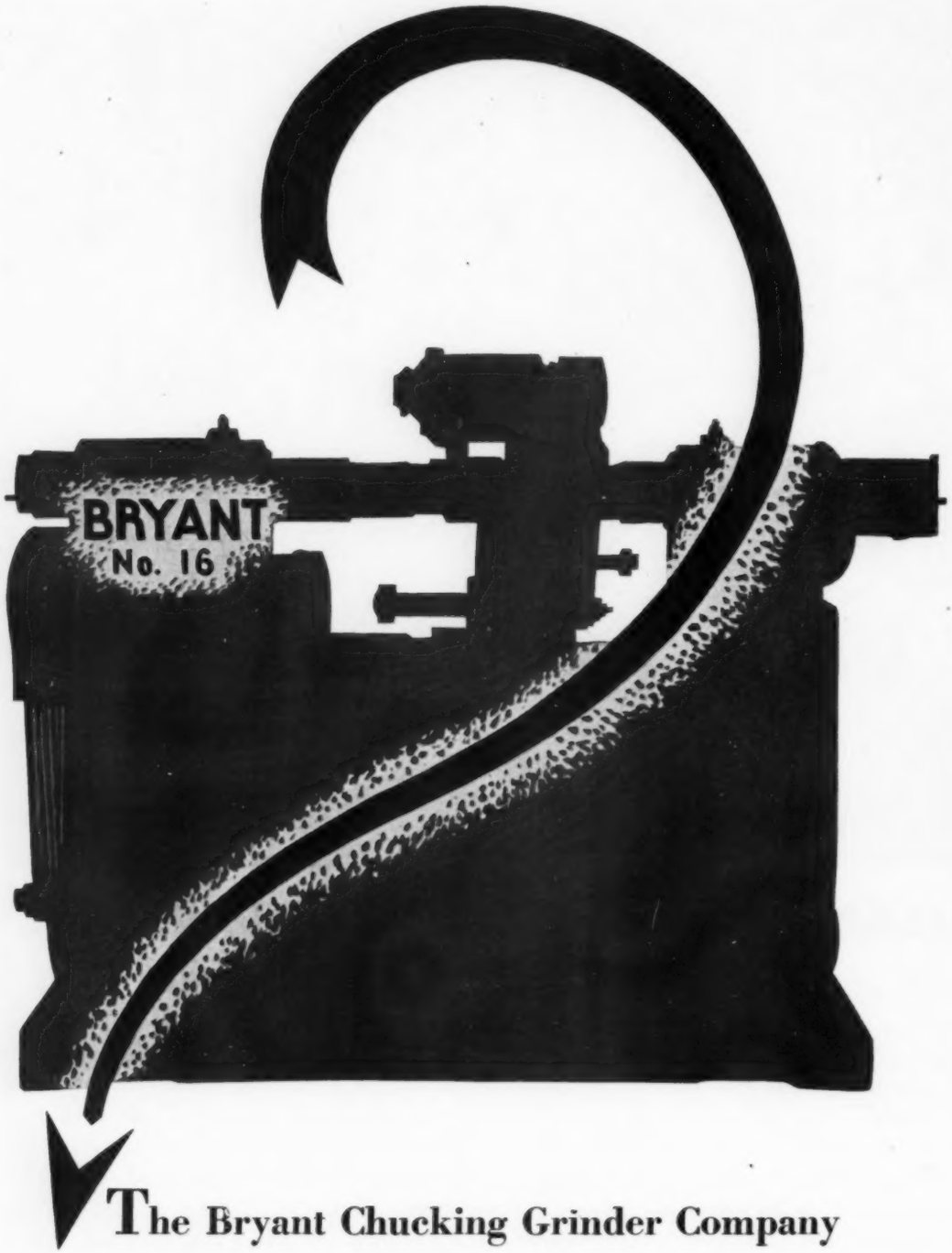
A positive drive under all conditions. Desired speed may be selected before starting or changed by fingertip control while running.

Automatically returns to low-speed, high-torque starting position whenever stopped. Accelerating time to preselected speed is adjustable.

Built as a compact unit with any make of motor. Adaptable to any mounting position —vertical or horizontal, sidewall or floor.

Catalog PA upon request. The New Departure Mfg. Co., Bristol, Conn., a division of General Motors.

NEW DEPARTURE
Variable Speed
TRANSITORQ



The Bryant Chucking Grinder Company

. announce a new

INTERNAL HYDRAULIC GRINDER

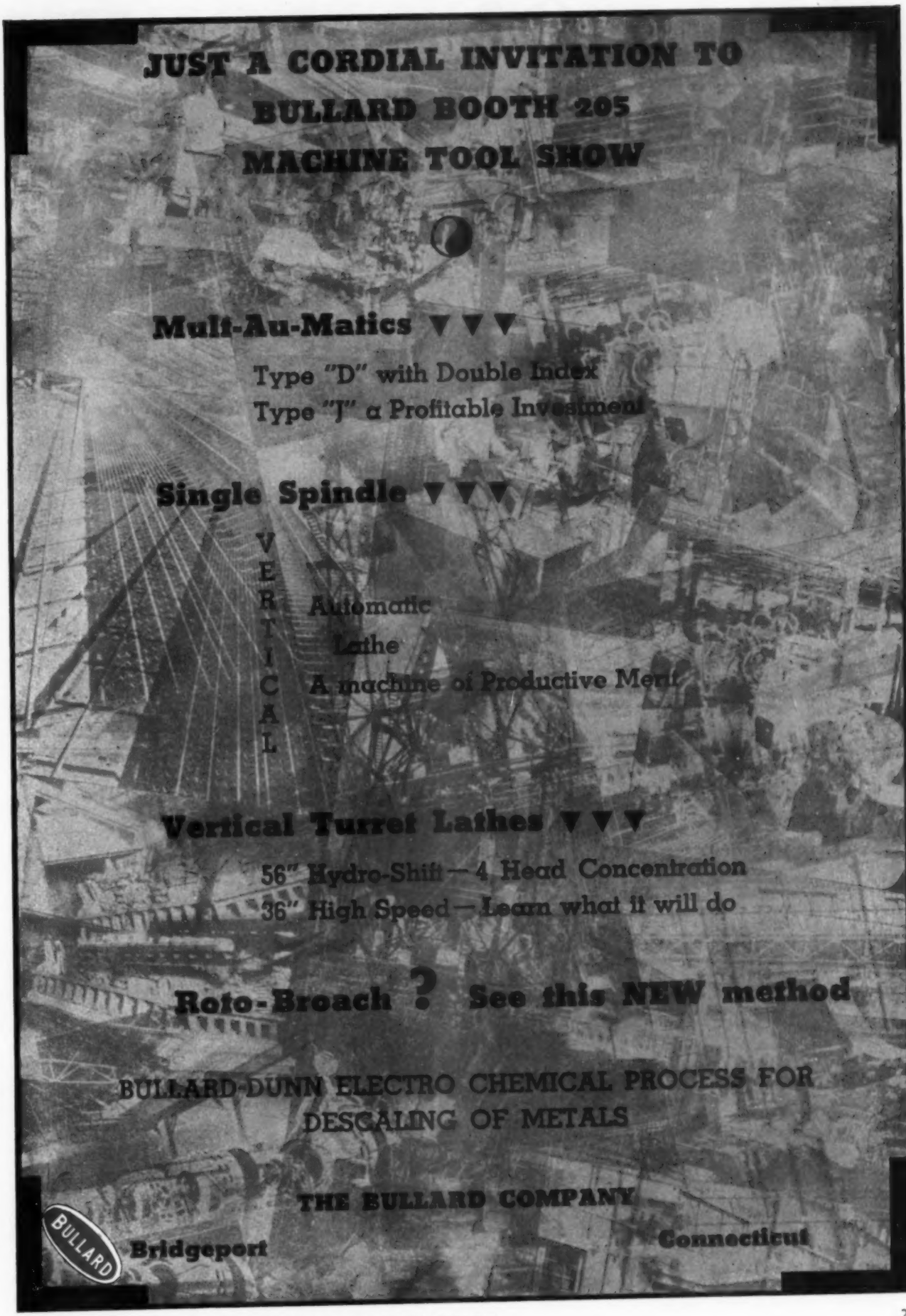
to be shown for the first time at the Cleveland Show

Better production . . . More accurate . . . Easier to operate

Be sure to see it

BRYANT CHUCKING GRINDER COMPANY

SPRINGFIELD, VERMONT, U.S.A.


JUST A CORDIAL INVITATION TO
BULLARD BOOTH 205
MACHINE TOOL SHOW
Mult-Au-Matics ▼ ▼ ▼
Type "D" with Double Index
Type "J" a Profitable Investment
Single Spindle ▼ ▼ ▼
VERTICAL
Automatic
Lathe
A machine of Productive Merit
Vertical Turret Lathes ▼ ▼ ▼
56" Hydro-Shift — 4 Head Concentration
36" High Speed — Learn what it will do
Roto-Broach ? See this NEW method
BULLARD-DUNN ELECTRO CHEMICAL PROCESS FOR
DESCALING OF METALS
THE BULLARD COMPANY
BULLARD
Bridgeport
Connecticut

HEADQUARTERS

THERE IS NO BETTER PAYING INVESTMENT

OF ACCURACY

BOOTH № 906 IN CLEVELAND

As in 1929 the Pratt & Whitney exhibit in Cleveland will occupy the largest space of all, this time almost five thousand square feet. It is directly opposite the stairway leading from the upper to the lower level in the large hall. You can stand at the rail of the upper level and see it spread out before your eyes. Never before have we concentrated so much time, money, material and men in one spot to give you what we believe is the finest exhibition of Accuracy in the machine tool industry.

We are sending seven carloads of equipment to Cleveland, and the most expert operators in the country. You will see these men handling machines that have never been shown before, and producing amazing results. You will see metal monsters working to dimensions as delicate as one ten-thousandth of an inch. There will be no "trick" demonstrations. Every job will be right out of the shop, and will prove the fine lasting accuracy built into Pratt & Whitney products.

Almost unbelievable tests of accuracy will be made before your eyes—things you will think of and talk of for months to come. If you have ever wondered how it is possible for us to check to one millionth of an inch, come and watch it done. You will see tiny "rainbows"—color fringes of light through an optical glass on the surface of a gage—and a lifetime of study will be required to understand it perfectly. You will see the latest developments in small tools, designed and heat treated to cut the newest alloys now used by industry. Books could be written upon the progress which has been made. We will show you gages which have cut inspection time from hours to minutes.

It would take all the pages in this magazine to tell you adequately what you can see for yourself in an hour here. Don't miss this opportunity. Bring yourself up-to-date on "Accuracy" in the industry, and on all the new features of machine tools that you must know about or lose step with progress.

We will give you a comfortable chair, a warm welcome and all the information we can. Be sure to visit the Pratt & Whitney Booth No. 906.

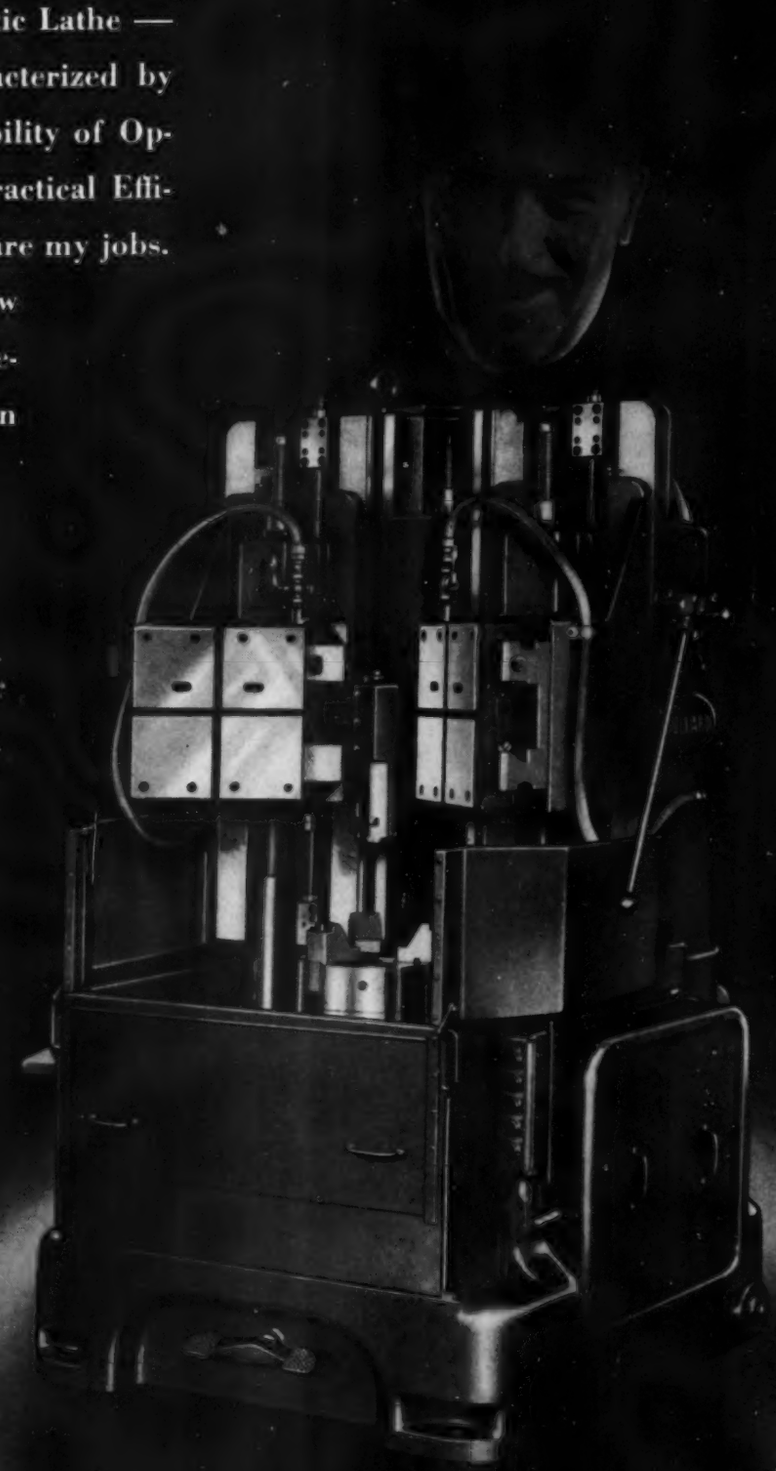
PRATT & WHITNEY CO.

HARTFORD, CONN.

THAN THE RIGHT TOOLS FOR THE JOB!

THE MACHINE SPEAKS

I — Bullard Vertical Automatic Lathe — am a manufacturing unit characterized by Economy, Simplicity, and Flexibility of Operation. My Ego is based on Practical Efficiency, and some of YOUR jobs are my jobs. My ability to produce and show Savings on your work is only dependent upon your interest in knowing what I can do. I belong in nearly any plant where reduced costs are the orders of the day.



Bullard Engineers are my voice, and I am flexible to their dictates. Let's get together — Right Now — dig up a few trial jobs — send your prints and requirements to Bullard for Time Saving Estimates.

And besides, I'll be at the Cleveland Machine Tool Show, and I'd like to make your acquaintance.

THE BULLARD COMPANY

BRIDGEPORT • • • • • CONNECTICUT

Presenting 4 New VAN NORMAN MILLERS

The New **# 32**

This new No. 32 is the *biggest* ... most *flexible* Van Norman Miller ever built.

It has greater range for large patterns, dies, jigs and fixtures. It has high spindle speeds ... anti-friction bearing construction throughout ... increased rigidity ... thoroughly modern design. It has the flexibility and accuracy so important for reducing costs and increasing the quality and quantity of production. Flexible ... because it has the famous Van Norman swiveling cutter head and sliding ram. Accurate ... because it reduces the number of set-up changes.

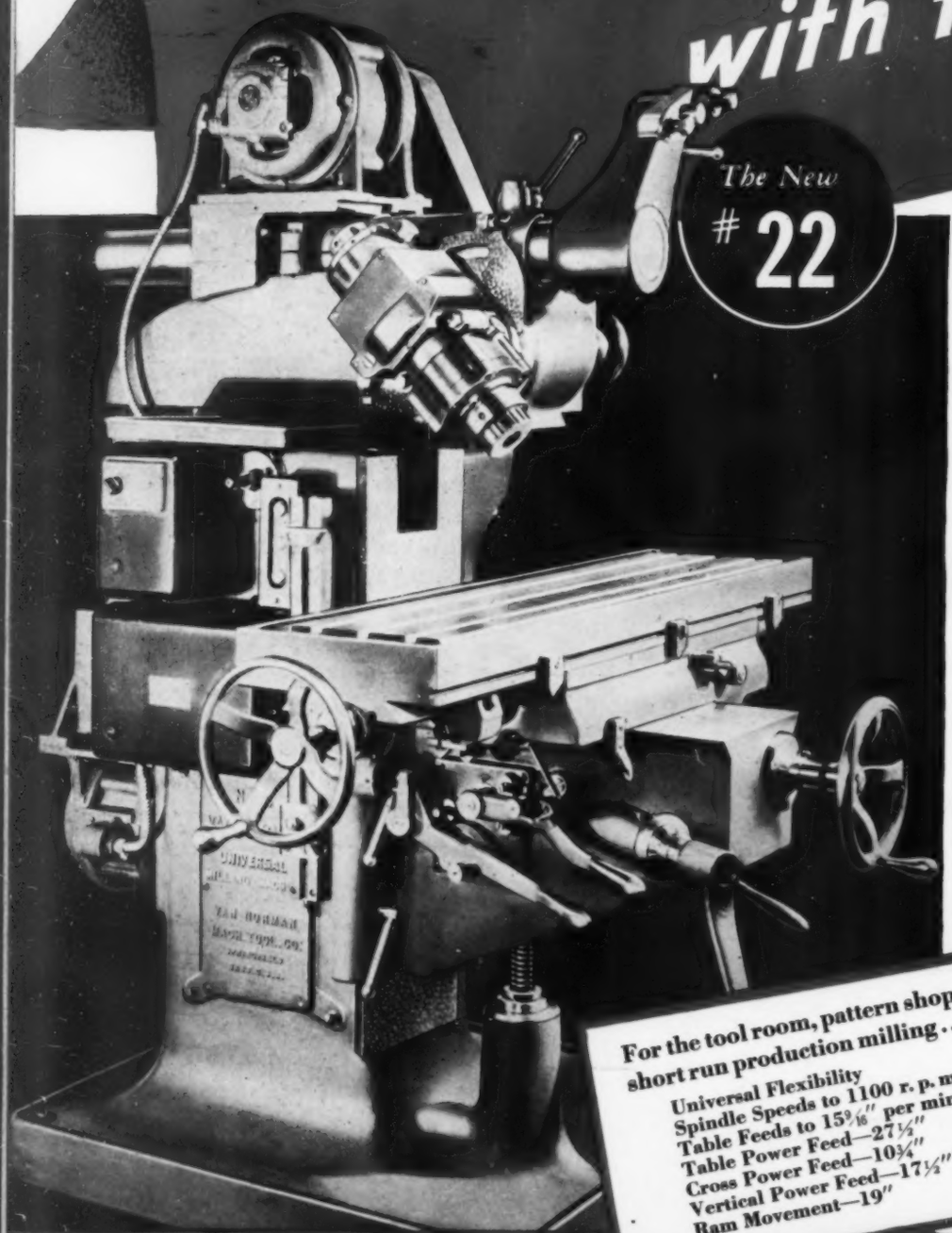
See this big No. 32 in our booth at the Cleveland Show. See how it will cut costs for you on tool room and pattern shop work, on short production runs.

For the tool room, pattern shop, short run production millings...

Universal flexibility
Spindle speeds to 1100 r. p. m.
Table size—55 x 12
Table Feeds to 15⅝" per min.
Table Power Feed—37½"
Cross Power Feed—10½"
Vertical Power Feed—23½"
Ram Movement—19"

VAN NORMAN

Save set ups— with the NEW



The New # 22

In this new No. 22, Van Norman presents another modern miller that is genuinely *universal.* Like the new No. 32, it mills vertical, horizontal and *angular* surfaces through the whole run of the table . . . is quickly adapted for drilling, cutting spirals and compound angles. Eliminates tricky blocking. Handles most jobs with a single set-up. With all its flexibility it combines accuracy and rigidity for the most exacting tool and die work . . . ample range . . . and speeds that will cut your costs on short run production milling operations.

See this machine in operation on pattern and die work at the Cleveland Show, or write for bulletin that shows how this advanced machine can cut costs for your company.

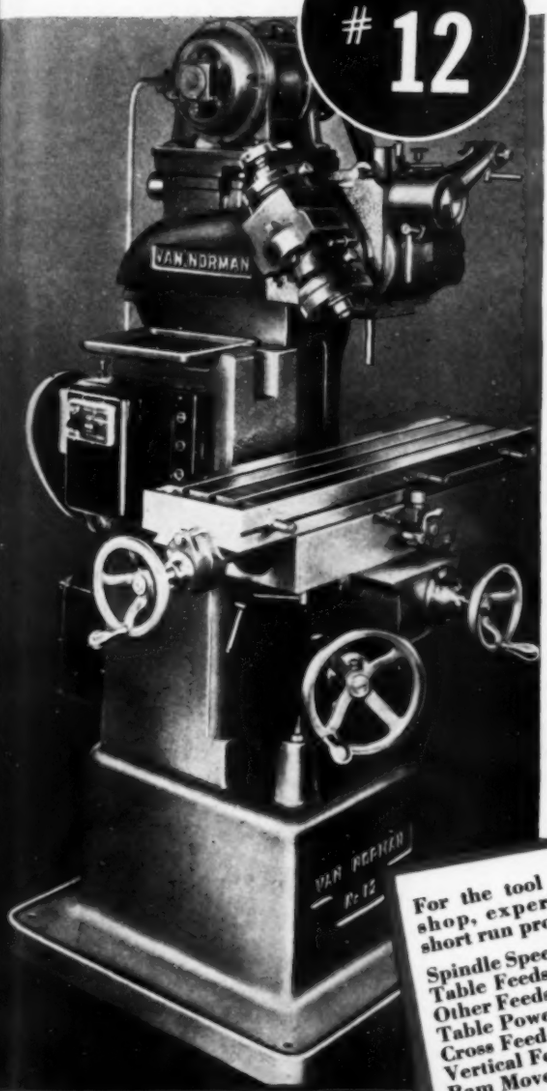
For the tool room, pattern shop, short run production milling . . .

Universal Flexibility
Spindle Speeds to 1100 r. p. m.
Table Feeds to 15 5/16" per min.
Table Power Feed—27½"
Cross Power Feed—10¾"
Vertical Power Feed—17½"
Ram Movement—19"

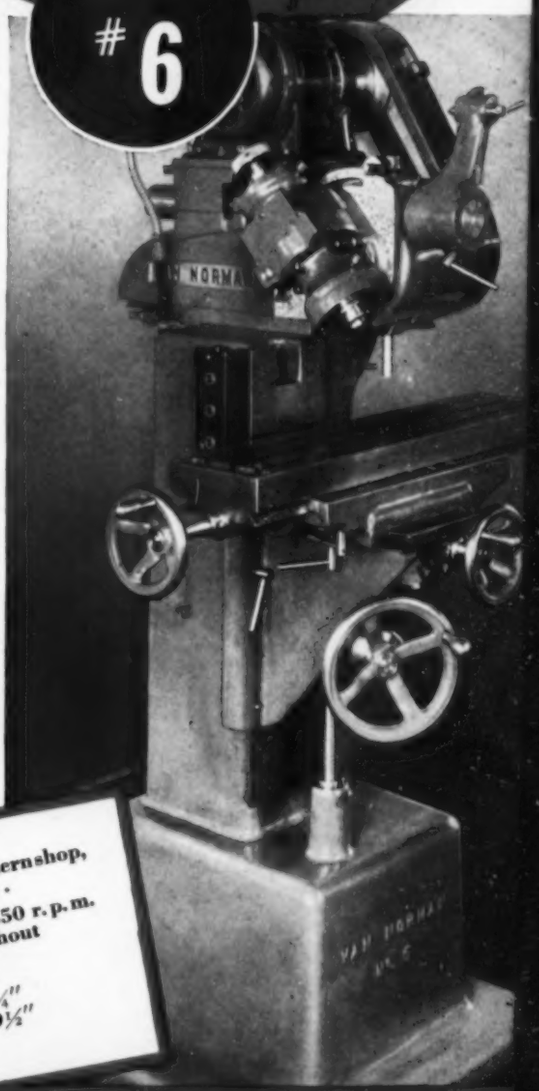
VAN NORMAN

Save money
VAN NORMAN MILLERS

The New **#12**



The New **#6**



These two new Van Norman Millers offer virtually all the flexibility and all 'round versatility of the big No. 32 and the No. 22. They have the famous swiveling cutterhead that makes it easy to mill all the vertical, horizontal, and angular surfaces on a job without changing the set-up. They have new speed . . . new rigidity . . . new accuracy.

If you run a tool room, experimental, pattern or contract shop be sure to see these two new millers at the Cleveland Show. Examine their rugged, vibration-proof construction, their modern design and the set-up-saving, money-saving features that will help increase the output of your shop.

For the tool room, pattern shop, experimental shop, short run production . . .

Spindle Speeds to 1465 r.p.m.
Table Feeds to 14" per min.
Other Feeds—Hand
Table Power Feed—19"
Cross Feed—6⅝"
Vertical Feed—17"
Ram Movement—10"

For the tool room, pattern shop, experimental shop . . .

Spindle Speeds to 1450 r. p. m.
Hand Feeds Throughout
Table Travel—18"
Cross Feed—5¾"
Vertical Feed—16¼"
Ram Movement—9½"

MACHINE TOOL COMPANY
SPRINGFIELD, MASSACHUSETTS

See CARBOLOY* ACTION at the MACHINE TOOL SHOW CLEVELAND, SEPT. 11–21

HIGHER SPEEDS!

GREATER ACCURACY!

LONGER TOOL LIFE!

BETTER FINISH!

SAVING IN METAL!

LOWER COSTS!

Many OF THE LEADING MACHINE TOOL BUILDERS *will demonstrate*

THE NEW, HIGHER ORDER OF ECONOMY, SPEED AND EFFICIENCY YOU CAN OBTAIN FROM MODERN MACHINES EQUIPPED WITH CARBOLOY CEMENTED CARBIDE TOOLS.

FOR A COMPLETE LIST OF DEMONSTRATIONS *visit* CARBOLOY BOOTH E-206

CARBOLOY COMPANY, INC.
DETROIT, MICHIGAN

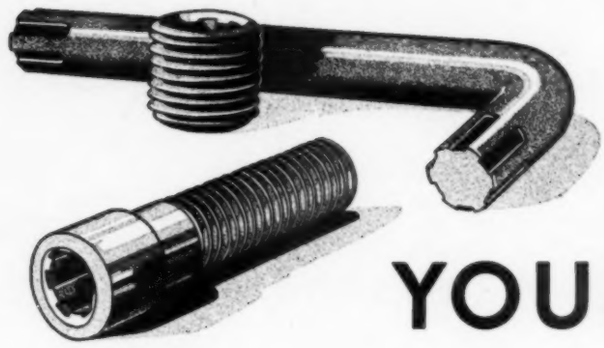
CHICAGO · NEWARK · CLEVELAND
PHILADELPHIA · PITTSBURGH

CARBOLOY*

CEMENTED CARBIDE

*Reg. U.S. Pat. Off.

The Mark of CARBOLOY



MODERNIZE YOUR MACHINES as well as your plant

According to a recent survey, a surprisingly large number of machine tools now in use are obsolete. They are no longer fit to give the service which is demanded.

These facts are fairly well known. Even more encouraging, an ever-growing number of plants are planning to do something about the situation. Many are now doing it. More will, after they have seen the coming Cleveland Machine Tool Show.

However, do not let this point escape you. In your determination to modernize your shop, see that the new machinery you purchase reflects the most modern design. See that it is equipped with Bristo Socket Head Cap Screws, Bristo Socket Set Screws and the features and economy in design which only Bristos make possible.

Check the adjoining list of Bristo advantages carefully. Figure out what these would mean to you. Then write us for a copy of our new bulletin, now on the press.

VISIT BOOTH A-303 AND SEE HOW BRISTOS WILL *BETTER* YOUR MACHINES

(1) Bristos eliminate protruding screw heads and so make possible compact design.

(2) Similarly, the flush surfaces obtained on rotating parts banish danger in operation and hazard to workmen.

(3) Freedom from protruding screw heads facilitates cleaning.

(4) By virtue of the smaller socket sizes required, Bristos save space and weight.

(5) They permit a smaller flange overhang.

(6) Also since Bristos are set up with a Bristo Wrench, and not with an ordinary wrench, Bristos can be located closer to vertical sections.

(7) Where parts must be clamped tight against heavy pressures, the great strength of the Bristo Fluted Socket Head Cap Screw is an advantage.

(8) Bristo Standard Socket Head Shoulder Screws may often be used in place of special studs for mounting gears, levers, links and similar attachments.

WHY BRISTOS ARE BETTER

Compare the direct turning pressure of fluted socket Bristos with the sidewall pressure of other socket designs that is liable to round out and even split the socket.

It is obvious that Bristos are better. Because of the gear-like action with which the Bristo Wrench meshes into the fluted socket, there is no fumbling. Or jamming. Even in handling the smallest sizes, (there are several standard sizes less than ¼ inch in diameter), there is no bother or trouble.

Once set, a Bristo stays set. It will not shake loose. Also consider the following additional features:

(*a*) Because of its unique fluted socket design, a Bristo withstands all the force needed for the tightest grip.

(*b*) It is easier and quicker to set up, particularly in hard-to-get-at places.

(*c*) It discourages tampering, — although in emergencies any ordinary screw driver, file or bar can be used in place of the Bristo Wrench.

(*d*) Bristos in all sizes can be made of "soft" alloys and metals such as Monel, Everdur, low carbon steel, and stainless steel.

(*e*) Bristos are given strength, stamina and toughness by means of Bristol's Automatic Heat Treating Instrument Control. Made in the same plant as the Bristo Screws themselves, and known and used throughout the world for its scientific precision.

Write for free samples of Bristo Set and Cap Screws.

ASK FOR FREE SAMPLES OF BRISTOL'S STEEL BELT FASTENERS

Provide a close, smooth permanent joint. No working loose or pulling out. No readjustments. No expert lacer or expensive machine is required. Only a hammer, your hands, and a block of soft wood.

Sizes and styles for every thickness and every material.

THE BRISTOL COMPANY ~ ~ WATERBURY, CONNECTICUT

Branch Offices: Akron · Birmingham · Boston · Chicago · Denver · Detroit · Los Angeles · New York · Philadelphia · Pittsburgh St. Louis · San Francisco · Canada: The Bristol Company of Canada, Ltd., Toronto, Ontario · England: Bristol's Instrument Co., Limited, London, S. E. 14

TRADE MARK

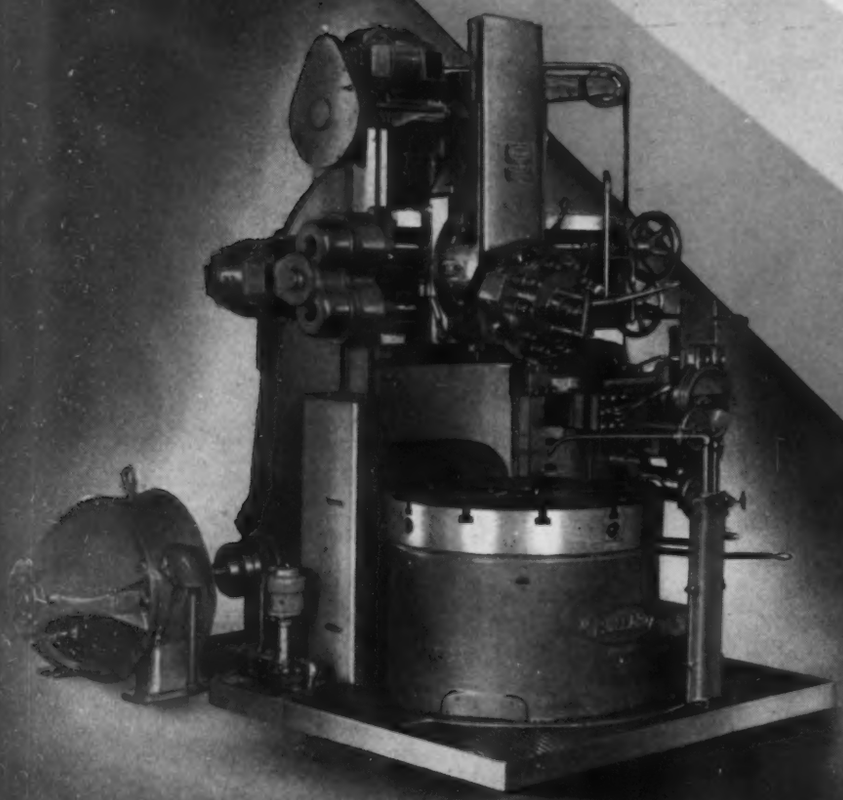
BRISTO

REG. U.S. PAT. OFF.

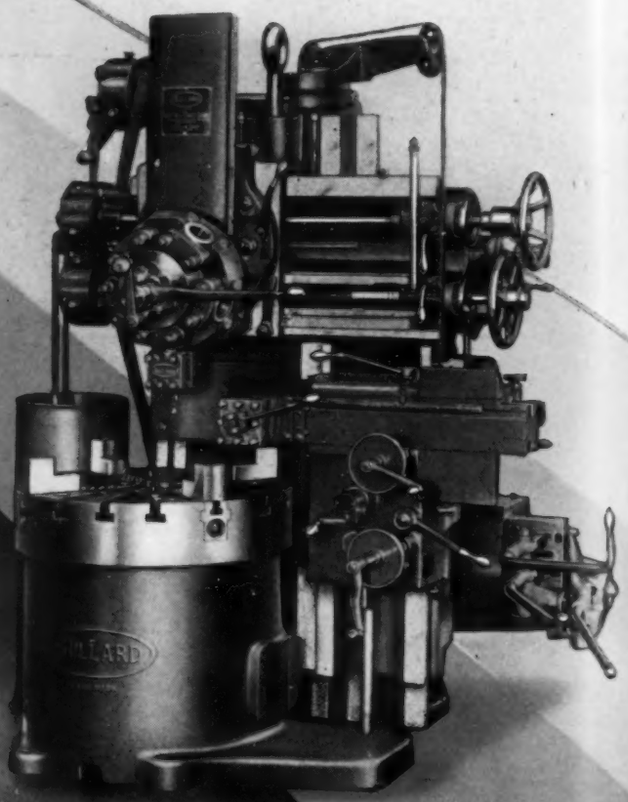
SOCKET SET SCREWS AND SOCKET HEAD CAP SCREWS

VERTICAL *Turret* LATHES

BULLARD



HIGH SPEED TYPE

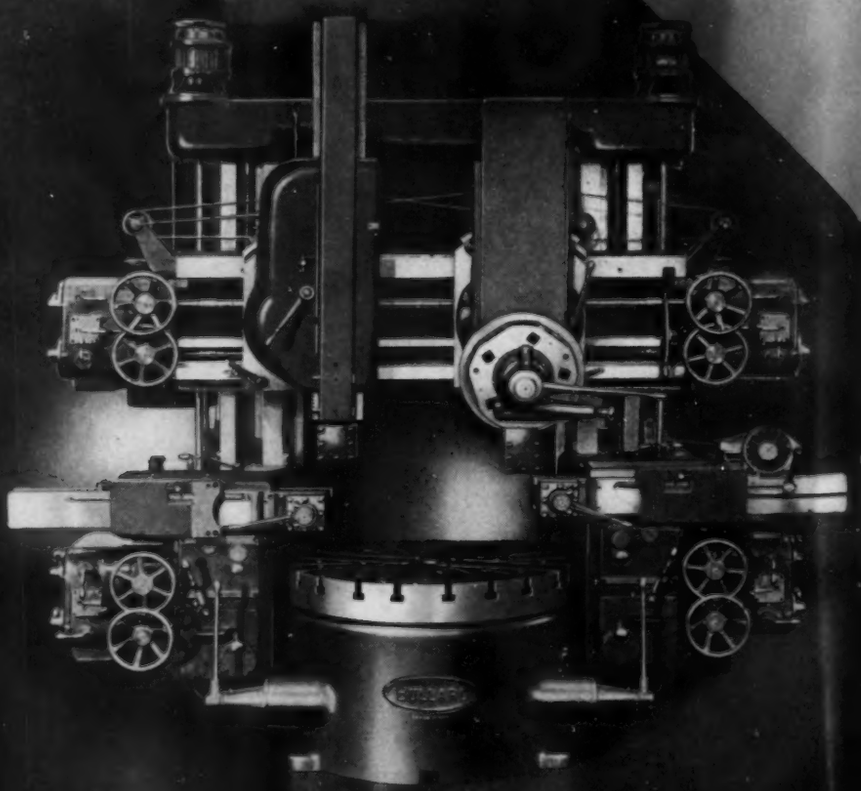


SPIRAL DRIVE TYPE

Machines are Good Investments only insofar as they Save Time, Result in Manufacturing Efficiency, and are Productive of Profits.

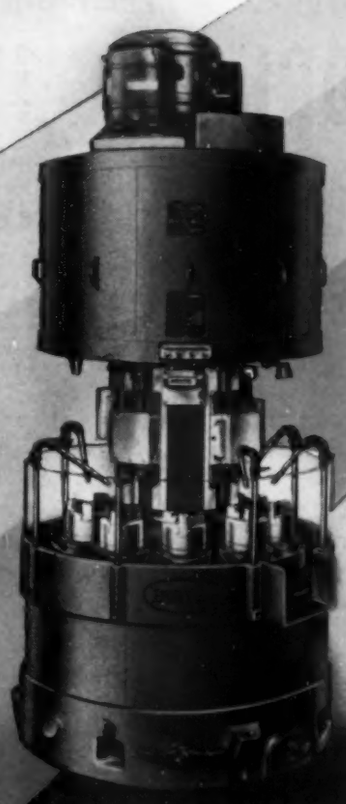
The Bullard Line of Vertical Turret Lathes offers these possibilities in your plant.

See them in operation at The Show, and come prepared to present your Problem Jobs.

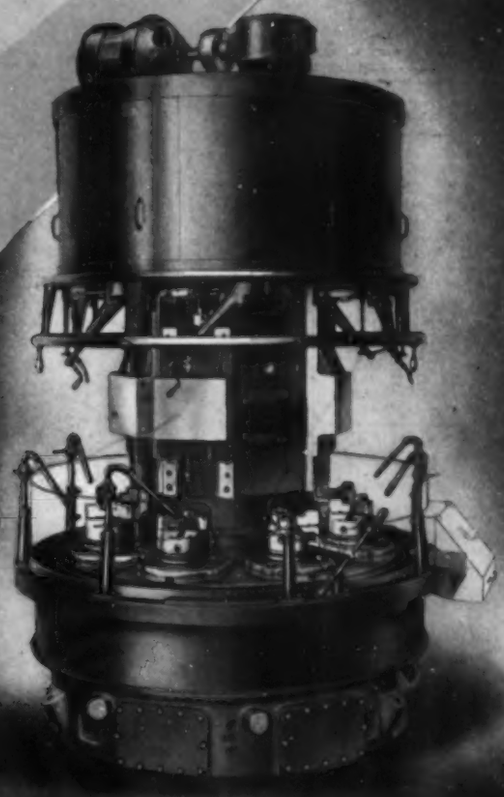


HYDRO-SHIFT

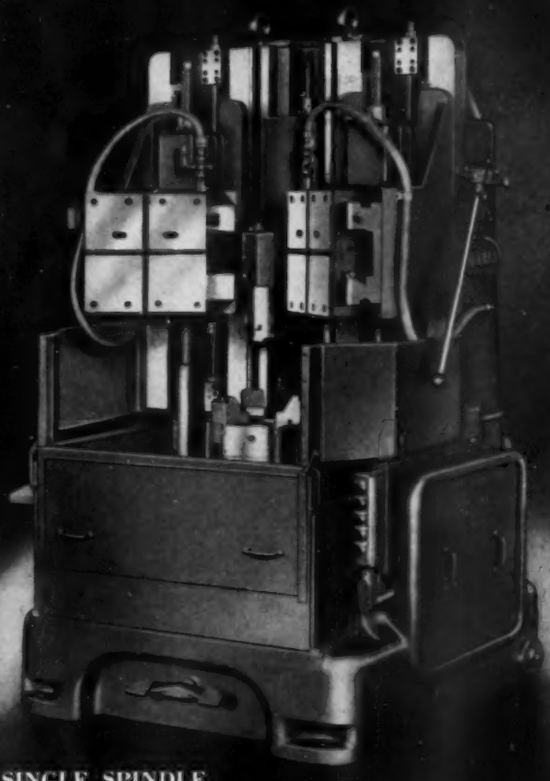
MULTIPLE *and* SINGLE SPINDLE AUTOMATICS



TYPE "J"
MULT-AU-MATIC



TYPE "D"
MULT-AU-MATIC



SINGLE SPINDLE
AUTOMATIC
LATHE

Requirements for Modern Automatics call for Low Cost reproduction of quantity lots in less time and to even closer limits than heretofore.

Ruggedness to withstand the higher speeds and heavier feeds as applied to the tougher materials of today's products is only one of many important features of Bullard Machine Design. See these manufacturing units at The Show.

... and Another Entirely

G&L TABLE and FLOOR TYPE HORIZONTAL BORING-DRILLING AND MILLING MACHINES

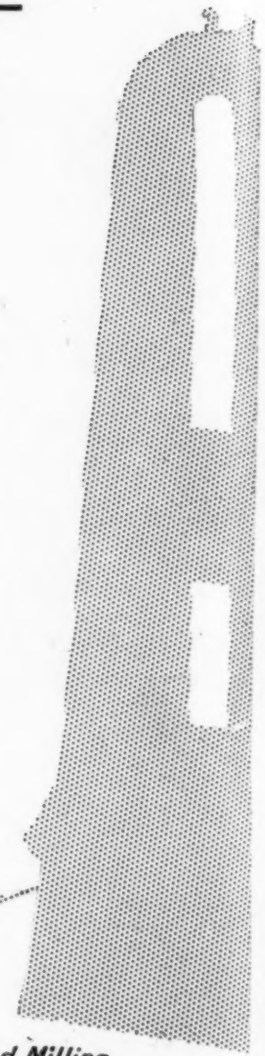
—to be Shown at the Cleveland Exposition

Once again the Giddings and Lewis specialists are preparing to demonstrate the latest developments in G and L Boring, Drilling and Milling Machines,—to show the new high standards to which they have carried the G and L method.

At Cleveland, they will display several entirely new type machines, with new precision and convenience of operation, that will provide the solution to many a knotty machining problem. Applicable to single piece or lot production, it will make even further reductions in the floor to floor time records of its predecessors.

You can not afford to overlook the G and L Method in machining your large castings. With it you have just one set-up, and greater speed and accuracy.

Investigate the G and L Method at the Cleveland Exposition. Remember, Booth No. 110, where our experts in Boring, Drilling and Milling will be glad to explain the production savings you can make. If you won't be there, send us your blueprints, so that we can show you how to adapt the G and L Method to your particular job.



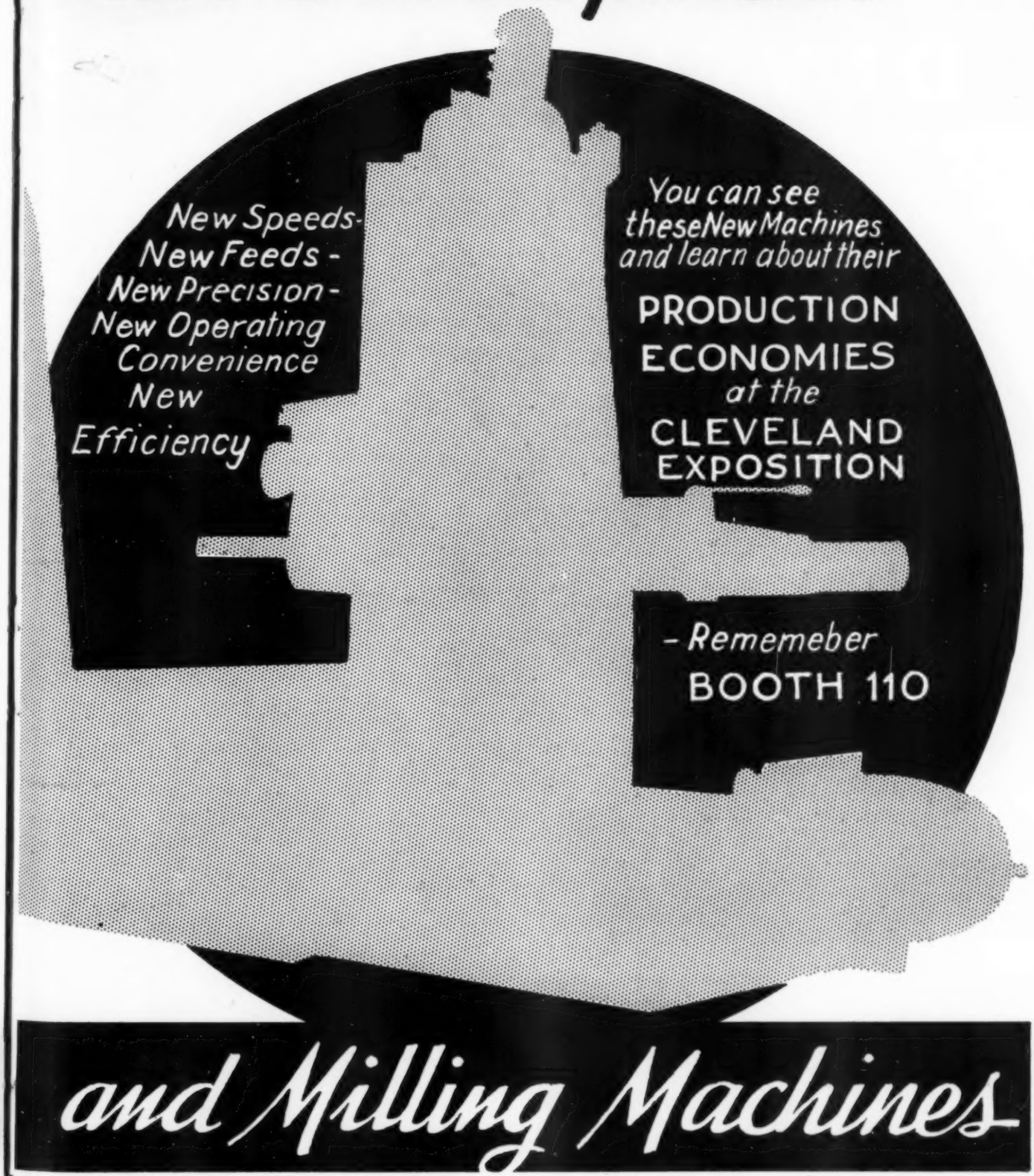
BE SURE TO VISIT BOOTH 110
and See These Entirely New Developments in Horizontal Types Boring, Drilling and Milling Machines

Specialists in Horizontal Boring, Drilling and Milling

GIDDINGS & LEWIS MACHINE TOOL CO.
FOND DU LAC, WISCONSIN
ESTABLISHED—1859—

G&L Boring-Drilling

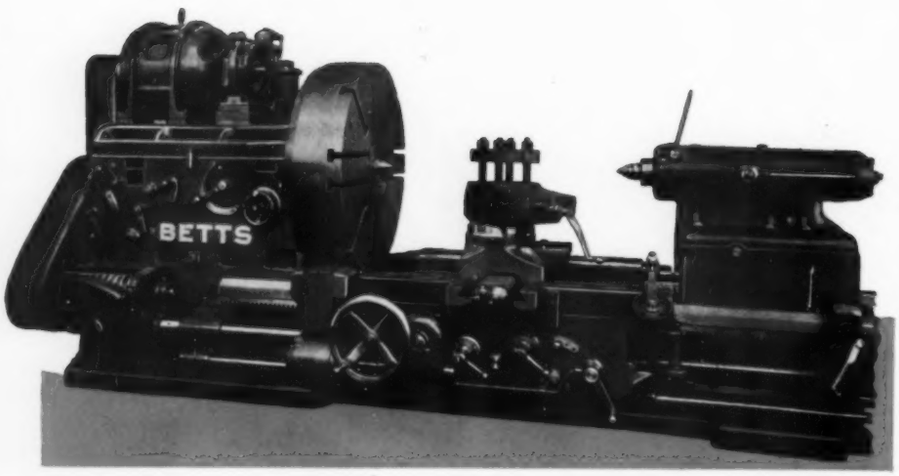
New Development ...



and Milling Machines

CONSOLIDATED DEVELOPMENTS

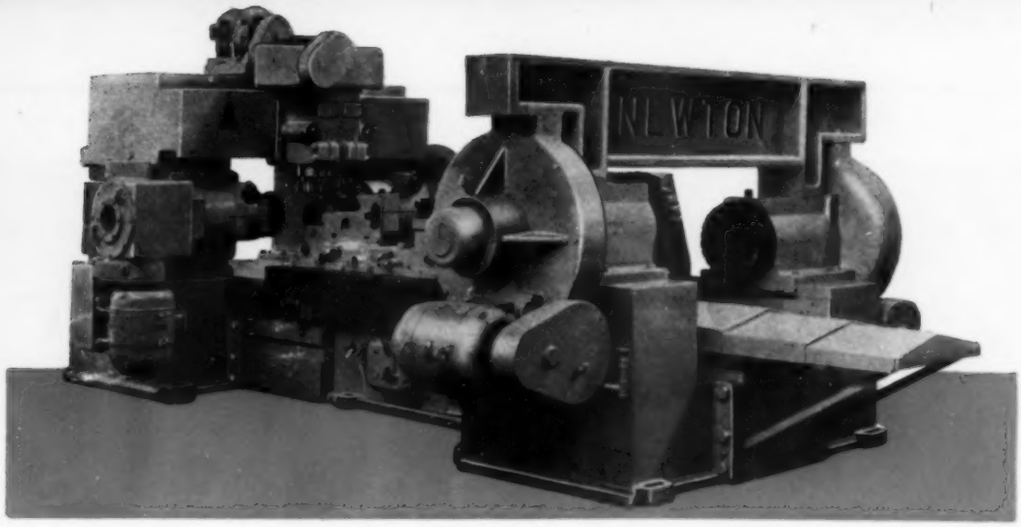
The machines shown on these pages were developed by Consolidated. They are representative of machine tools for today's requirements — incorporating modern design and simplicity of construction with extreme accuracy which is characteristic of all Consolidated Machine Tools.



Betts-Bridgeford 48" Heavy Duty Engine Lathe

Newton Drum Type Unit Head Milling Machine

Colburn Hydraulic Two Spindle Boring and Drilling Machine



Newton Six Spindle Special Milling Machine

Betts Hydraulic Feed
Car Wheel Boring Machine

Colburn Hydraulic Feed Five Spindle
Boring and Facing Machine

Consolidated Modern Equipment for the metal working industry includes Milling Machines of practically every type —Engine Lathes—Planers—Crank Slotters—Boring Mills, both with and without side heads—Cold Saws—Drill Presses —Special Machines and Plate Shop Equipment. They are built under the following trade names:

BETTS BETTS-BRIDGEFORD NEWTON
COLBURN HILLES & JONES MODERN

CONSOLIDATED

MACHINE TOOL CORPORATION

ROCHESTER NEW YORK

FOUNDED SELLERS 1848

SELLERS

FOR THE NEW

At the Show . . Booth No. 401

SELLERS MACHINE TOOLS — Planer Type Milling Machines . . . Double Housing and Openside Planers . . . Plate Planing Machines . . . Vertical Boring and Turning Mills . . . Horizontal Boring, Drilling and Milling Machines (Table Type, Floor Type and Planer Table Type) . . . Special Machinery . . . Drill Grinders . . . Tool Grinders

WILLIAM SELLERS & CO., INCORPORATED

MACHINE TOOLS

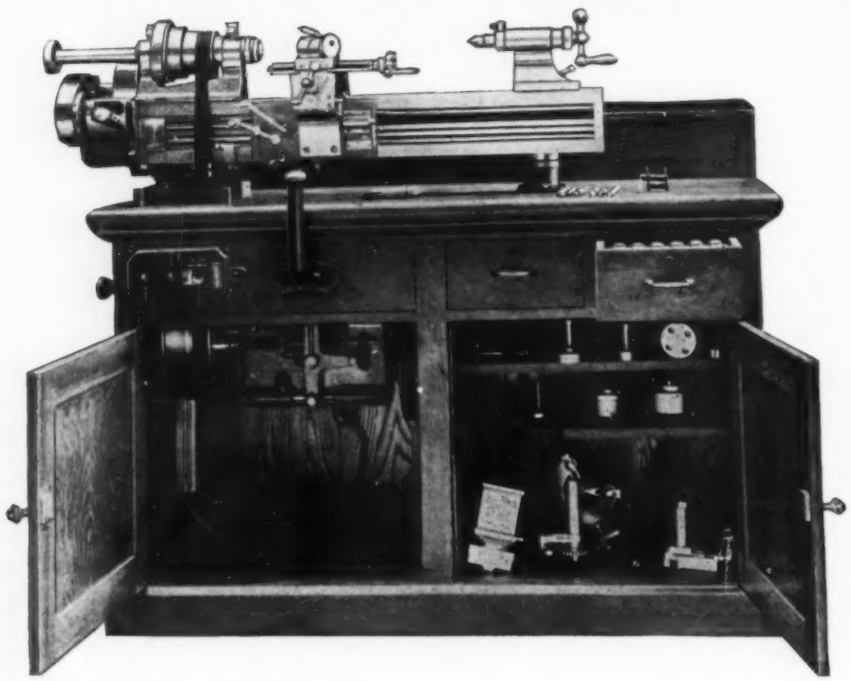
PRODUCTION ERA

Write for New Complete Catalog

SELLERS RAILROAD SHOP TOOLS—Car Wheel Lathes . . . Driving Wheel Lathes . . . Car Wheel Boring Machines . . . Driving Box Boring Machines . . . Locomotive Tire Boring and Turning Mills . . . Locomotive Frame Slotters . . . Locomotive Cylinder Boring and Facing Machines . . . Air Brake Cylinder Boring Machines

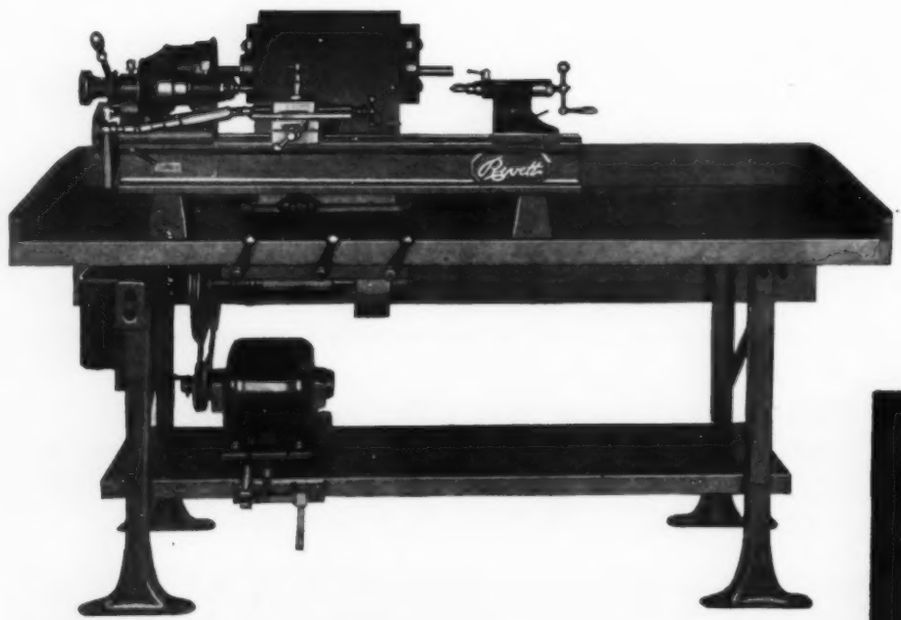
1600 Hamilton Street . . . . . PHILADELPHIA

Let us DEMONSTRATE . . . Cleveland Show—how RIVETT BENCH DEVELOPMENT is in PACE WITH THE



RIVETT NO. 608
Precision Back Geared Screw Cutting Lathe

Used throughout the World as a master tool in tool rooms, laboratories and development departments where the highest possible standards of accuracy are required. Turns or bores within .0001" in 6 inches—faces to 8" diam. within .0002" concave—cuts threads within .0005" lead in 12 inches. Maximum bearing areas assure maximum precision life. Wide variety of work can be handled accurately with minimum set-up cost. Complete variety of finely made attachments enable user to complete practically any operation without recourse to other machines.



RIVETT NO. 505
Precision Plain Bearing Bench Lathe

Same super-precision plain bearing and spindle construction as the Model 608 and furnished with a complete line of attachments for turning, boring, milling, thread cutting, etc. Built in five headstock sizes from ½" to 1¼" and suited for all bench lathe purposes. Easy to set up, little power to drive, more accurate on small work,—they are always busy. Shown with Rivett Horizontal Safety Drive providing 12 selective spindle speeds.

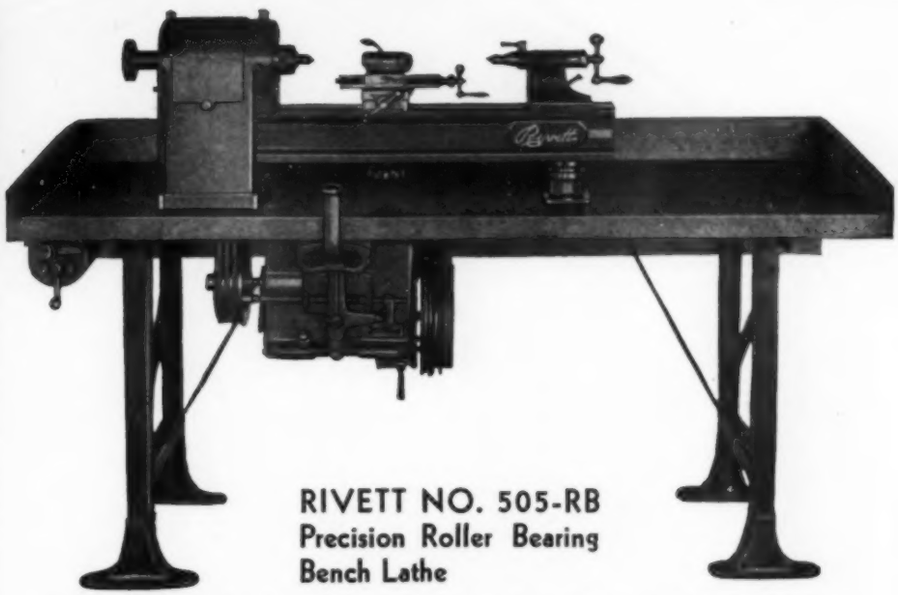
RIV

at the LATHE TIMES

Our skilled demonstrators at the Cleveland Machine Tool Show will be glad to answer all questions regarding RIVETT Bench Lathes—and to explain the details of construction that provide superior precision, durability, power and speed.

They'll be glad to tell you also why and where these *Better Bench Lathes* are taking on new jobs in progressive plants throughout the country. And if you'll furnish the blanks they'll be glad to *SHOW YOU by actual operation,* how your own jobs can be handled more accurately and more economically.

The same information will be supplied promptly by mail. Write us *today* about any troublesome machining job on small bar or chuck pieces in your tool room or shop—and we'll promise to show you either how to cut production costs, or how to turn out a better product at no greater cost.



RIVETT NO. 505-RB
Precision Roller Bearing Bench Lathe

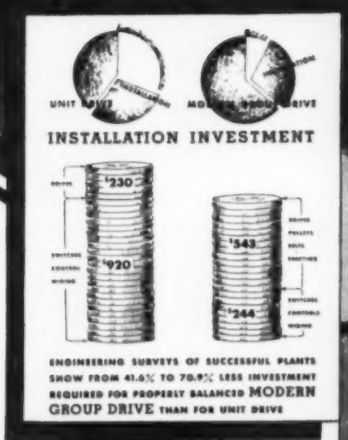
The 505-RB lathe is equipped with Timken "Zero Quality" Precision Roller Bearings rated to carry 1175 lbs. radial load, and 1180 lbs. end thrust at 3000 r.p.m. continual duty and is furnished with either enclosed head as illustrated, or with open-type headstock; and with either endless flat or multiple V-belt drive. With Speed Box Motor Drive as shown, 6, 8, 12, or 18 well graded spindle speeds from 200 to 2300 r.p.m. are available.

RIVETT NO. 505-BB
Precision Ball Bearing Bench Lathe

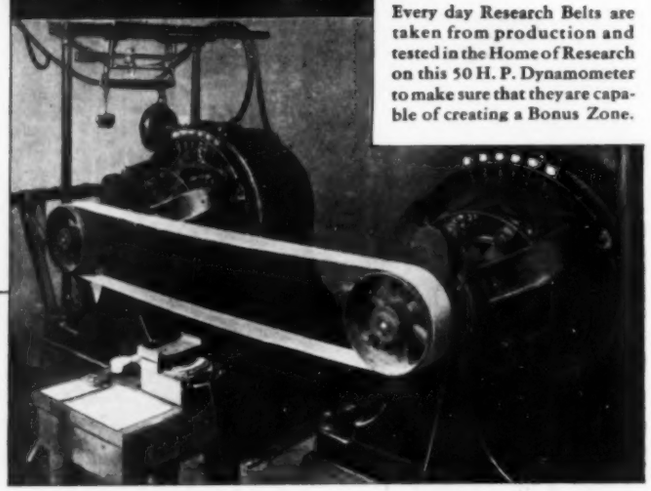
The 505-BB lathe is designed for high production on small bar or chuck work, equipped with Rivett Direct Motor Drive, as shown, has maximum spindle speed of 4600 r.p.m. High spindle speeds and use of tungsten carbide or diamond cutting tools insure perfect finish. Equipped with Automatic Slide Rest, this lathe is unequalled for turning carburetor needles, metering pins, etc.

RIVETT LATHE & GRINDER Inc.
BRIGHTON, BOSTON, MASS.
BOOTH 1010 at the show

the


INSTALLATION INVESTMENT
$230
$920
$343
$244
ENGINEERING SURVEYS OF SUCCESSFUL PLANTS SHOW FROM 41.6% TO 70.9% LESS INVESTMENT REQUIRED FOR PROPERLY BALANCED MODERN GROUP DRIVE THAN FOR UNIT DRIVE

Modern Group Drive is reduced to its simplest terms in our own book entitled "From the Home of Research". Have a Graton & Knight engineer call to discuss Modern Group Drive with respect to *your* transmission layout. No obligation.



Every day Research Belts are taken from production and tested in the Home of Research on this 50 H. P. Dynamometer to make sure that they are capable of creating a Bonus Zone.

MODERN GROUP DRIVE PTC

GRATON AND KNIGHT

• • THE HOME

" . . . *so that* POWER

GRATON & KNIGHT CO..

OTHER PRODUCTS: BELT CEMENTS AND DRESSINGS · LEATHER PACKINGS · LACE

What is the reason for Research Belting's 100% greater resistance to the tremendous strains of a power drive? . . . Because the Home of Research engineers have gone to the principal source of stretch — the fibre — to remove the trouble before the belt goes on the drive.

Test for yourself how important it is to consider the arrangement of the fibres in any fibrous material. Try to stretch the cloth of your trouser-leg, pulling up and down along the crease. It won't stretch. Now pull it at an angle off the perpendicular (not sideways — but diagonally). It stretches. That's because the arrangement of the fibres is different with respect to the strain.

In a much more complicated way, the same thing is true of leather belting. And only Graton & Knight — in its Home of Research laboratories — has succeeded in so treating its Research leather that the fibre arrangement is most efficient for carrying the load.

TROUSER-LEG *test*

Shows why Research Belting brings you NEW PROFITS *by creating the* "BONUS ZONE"

Because Research Belting delivers more power between the pulleys and steps up average machine speed, it actually produces a production bonus in the form of extra units at no extra production cost.

A large chemical concern reports a bonus of 17⅔ cents on every tank of gas now that Research Belting has turned each drive into a Bonus Zone. Similar profits are being made throughout all types of plants — running to large sums in plants having many belt drives.

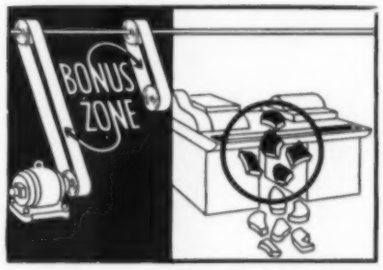
Specifying Research Belting for *your* plant will create Bonus Zones on all your drives, each of them serving to lower your per-unit cost. Because the belt that stretches the least is the belt that pays the most, facts like the following are highly significant:

Compressor — "A Research double installed in November 1931, has not been shortened once nor has the motor been moved."

Countershaft drive — "Installed 2 months, but not cut yet."

Heald #25 Grinder — "Not shortened in 10 months."

Variable speed condenser — "Installed March 2, 1932, not shortened once."



From the Bonus Zone . . . higher average machine speed, more units per hour, and a new production profit . . . thanks to Research Belting.

OF RESEARCH

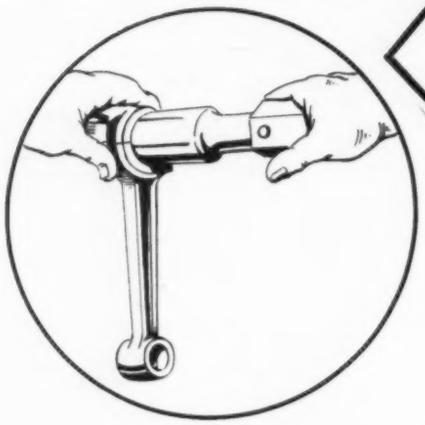
TRANSMISSION *shall be better"*

WORCESTER, MASSACHUSETTS

LEATHER · CUT LACE · HAND LEATHERS · WHOLE LEATHER AND SCRAP LEATHER

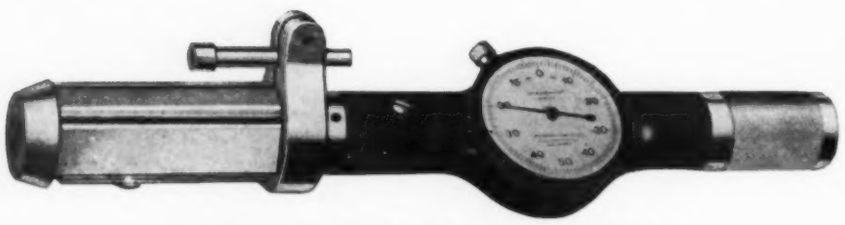
1614

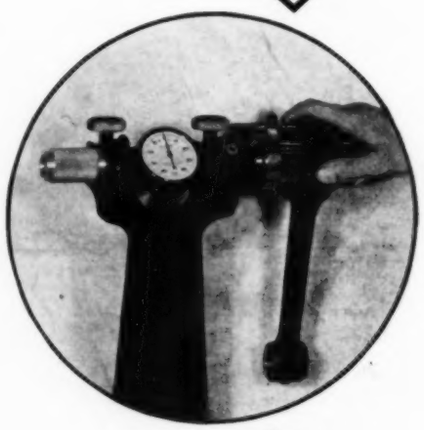
• LEADE in production



guessing in '29—with old-fashioned plug gages

knowing in '35—with the modern "STANDARD" DIAL PLUG





The "STANDARD Dial Plug Gage" gives all essential measurements of bores on a production basis. It is furnished with indicator graduated on .0001", .0005", or .001" and in Metric 1/100 mm, 1/200 mm, or 1/500 mm.

"STANDARD" DIAL INDICATOR

This instrument represents engineered simplicity achieved by a Leader in measuring devices.

No part has been included which could be eliminated; nothing has been left out which is essential to accuracy, sturdiness and smooth action.

Standard Dial Gages are made in models, sizes and graduations to meet all requirements of modern gaging practice.

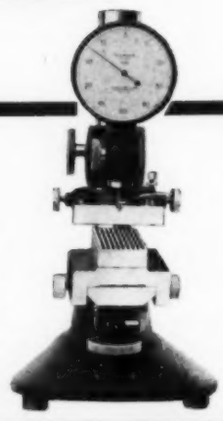
"STANDARD" DIAL COMPARATOR

This precision instrument assures rapid, accurate and easy inspection of parts requiring ten thousandths of an inch measuring precision.

Contact indicating point is tipped with a lapped diamond; range of indicator is .012".

A serrated anvil of hardened, ground and lapped tool steel is mounted on a slideable receiver which can be set in various positions to prevent local wear and assure long life to the accuracy of the gaging surface.

Full capacity is 0 to 6". Graduated .0001".



RSHIP • gaging devices

ACCURACY—in checking bores on a production basis—has been made possible, with the advent of the "STANDARD Dial Plug Gage."

By supplying visual indication of bore diameters to the ten thousandth part of an inch, this new gage eliminates all the uncertainties and inaccuracies of the "feel" system on which the user of old-fashioned plug gages depended for measurements.

The human element is definitely *out,* when the "STANDARD" Dial Plug comes in, because a positive, accurate dial reading replaces guesswork. Precise measurements can be made even by unskilled labor.

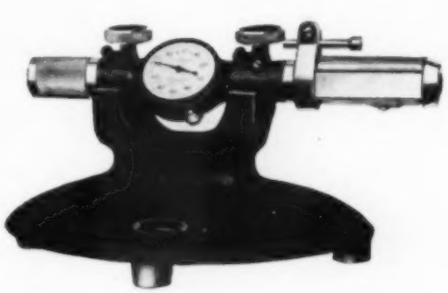
The new "Standard" Dial Plug goes far beyond the obsolete plug gage in its scope of measurement. It self aligns the work before it begins to indicate. It measures instantly any tapered, bell mouth or out-of-round condition over the full length of the bore. Measurements are made with respect to the axis of the bore and diameters indicated on the true center line. If limits are changed, the gage can be changed accordingly.

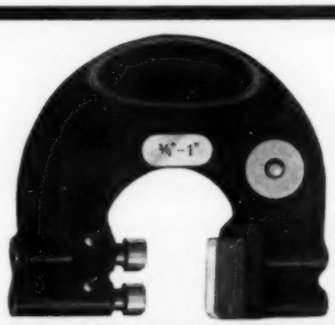
The "Standard Dial Plug Gage" provides both operators and inspectors with the same accurate, uniform method of gaging because it can be taken to the job, during production or the job taken to the gage for inspection.

Small wonder that in modern shops old-fashioned plug gages are being discarded for "STANDARD" Dial Plug Gages and that big savings have resulted through the elimination of costly rejections.

Get all the facts concerning this new development in precision bore measuring.

The "STANDARD Dial Plug Gage" used as a Bench Comparator vastly simplifies the work of inspection. With "STANDARD" Dial Plug Gages used in the shop and for inspection, an identical system is available for both departments.





"STANDARD" ADJUSTABLE SNAP GAGES

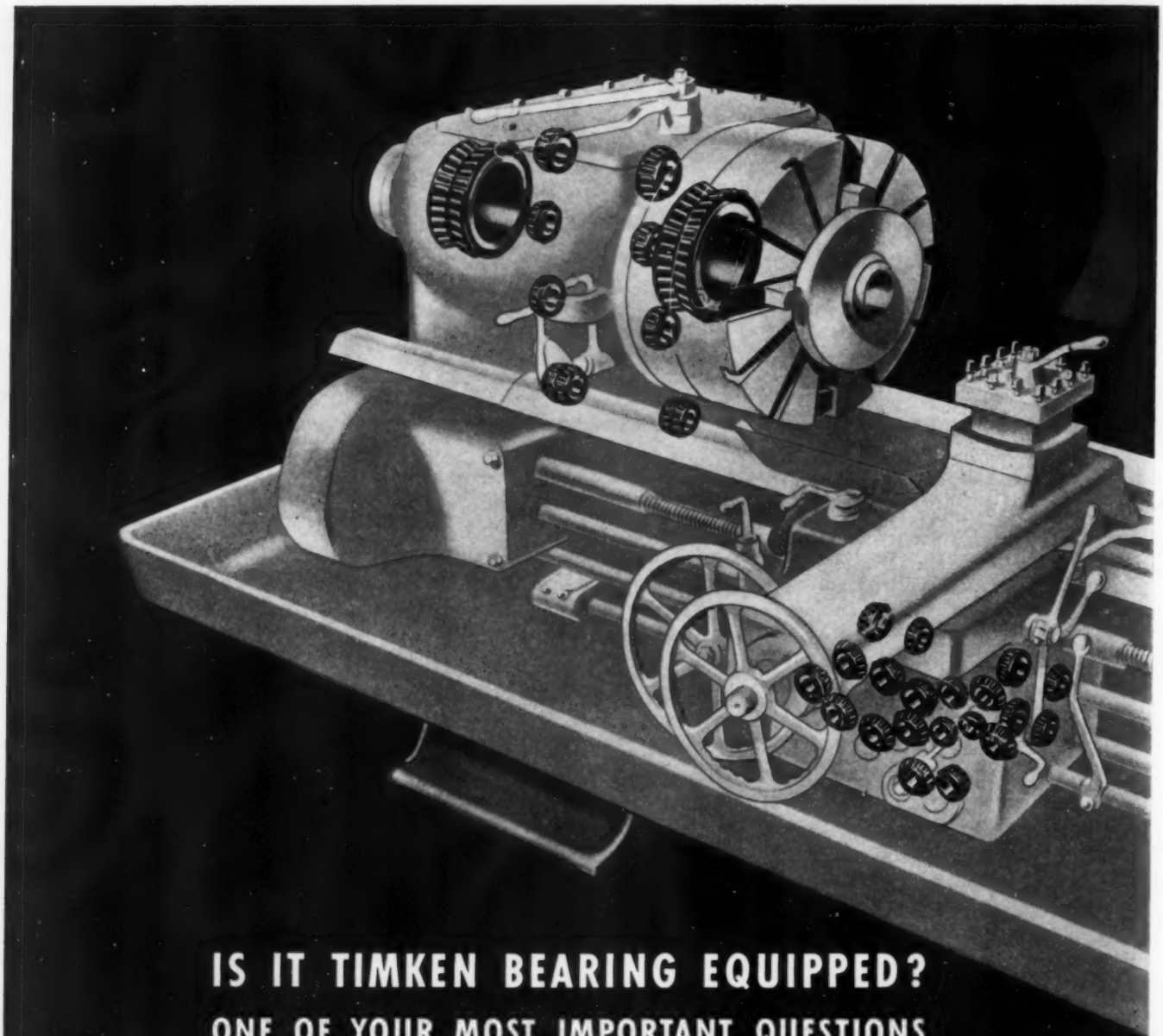
Absolute rigidity is assured by double tapered locking pins. Once set they cannot be changed even with hard usage.

Extra large gaging surfaces insure long life. Resetting is simple as well as quickly and accurately accomplished in a few minutes time.

These gages are provided with a "Handy Grip" reinforced frame — an exclusive "STANDARD" design. They are available also in four-pin models. "Specials" can be made to order.

STANDARD GAGE CO., INC.

POUGHKEEPSIE • NEW YORK •



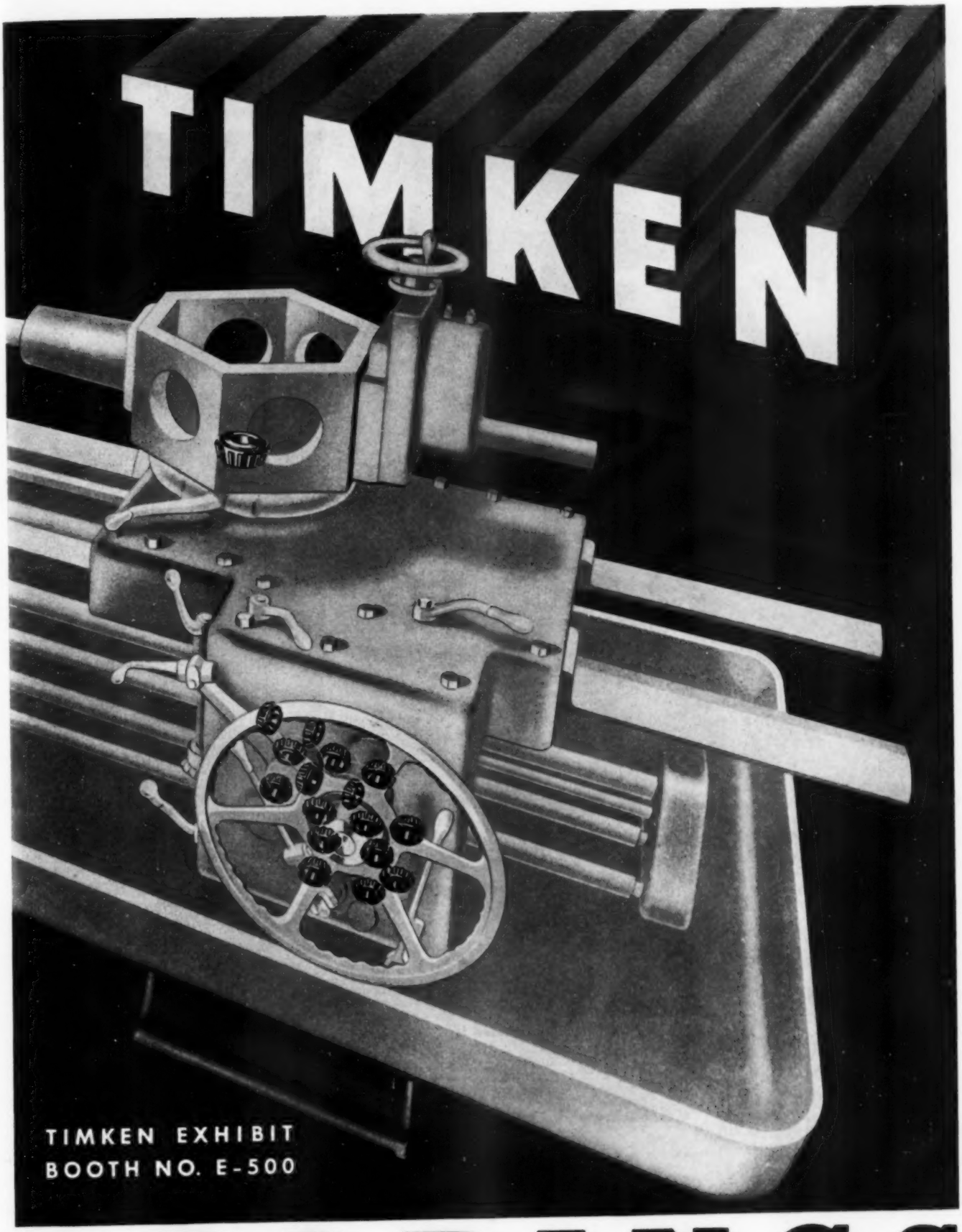
IS IT TIMKEN BEARING EQUIPPED?

ONE OF YOUR MOST IMPORTANT QUESTIONS WHEN BUYING HEAVY DUTY MACHINE TOOLS

• Your new machines will be MODERN if they are Timken-equipped . . . modern in accuracy of performance . . . modern in economy of operation. • You will find that the great majority of the heavy duty machines exhibited at the Machine Tool Show are equipped with Timken Bearings at the hard service points, including spindles and gear boxes. Look for them.

THE TIMKEN ROLLER BEARING COMPANY • CANTON, OHIO

TIMKEN *Tapered Roller*



BEARINGS

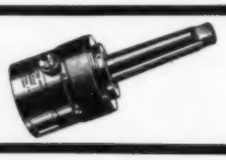
Go to Cleveland SEPT. 11-21

THE TYPE T HOBBING MACHINE

Taper Splines provide valuable advantages for mounting machine parts on shaft ends. The Barber-Colman Type T Hobbing Machine, shown above, generates taper splines on shaft ends quickly, accurately, and economically. Can also be used for all kinds of standard hobbing work. Investigate! See this machine in action at the Show.

NO. 3 HOB SHARPENING MACHINE

The Precision Universal Tool Head will be shown in connection with our exhibit. Remember the booth number, 903.



SEE OUR EXHIBIT IN BOOTH No. 903

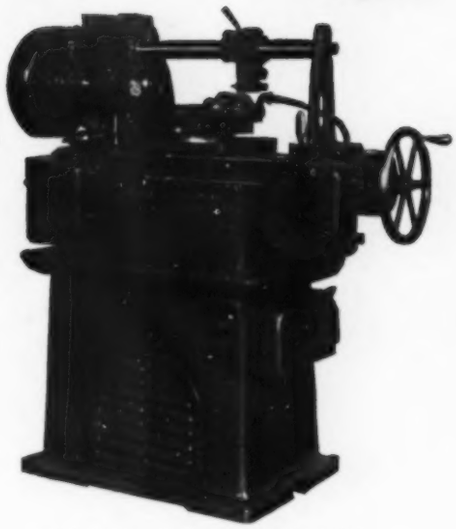
Acres of floor space—hundreds of tools—thousands of improvements and new ideas, in the Machine Tool Show at Cleveland, September 11 to 21. Plan to be there, and plan your tour of the show so that you will see everything.

HOBBING—If your product uses spur gears, helical gears, spline shafts, intermittent gears, ratchets, sprockets, square shafts or serrated parts—be sure to see the Barber-Colman exhibit in Booth 903. There you can see a complete demonstration of modern hobbing. This includes a variety of hobs, with tooth contours ground or unground; one of our Automatic Hob Sharpening Machines; a Number 3 Hobbing Machine, precision type; a Type A Hobbing Machine for accurate high production, and a Type T machine hobbing taper spline shafts. Our engineers in attendance will be glad to discuss hobbing in general or its application to the production of a particular type or piece of work, as well as many valuable hobbing improvements they have made since the last machine tool show.

REAMING—For those visitors interested in the production of accurate, smooth, straight holes there will be a display of Barber-Colman reamers, with one or more specialists present to provide complete information about the advantages offered by these highly accurate tools of unique design.

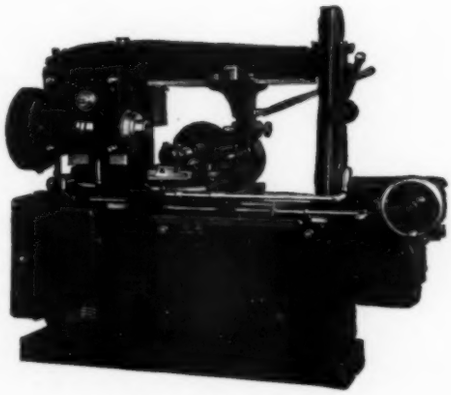
MILLING—Almost everyone visiting the show will be concerned in some way with the purchase or performance of milling cutters. For these visitors we shall have an interesting arrangement of Barber-Colman standard and special milling cutters with complete information about our cutter manufacturing facilities and engineering service.

WELCOME—A cordial welcome—and a comfortable chair, if you wish—awaits you at our exhibit in space No. 903.



NO. 3 PRECISION HOBBING MACHINE

HOBS



TYPE A HOBBING MACHINE

CUTTERS

BARBER B-C COLMAN

PRODUCTS

MILLING CUTTERS, HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, SPECIAL TOOLS

BARBER-COLMAN COMPANY

General Offices and Plant ROCKFORD, ILLINOIS, U. S. A.

TWO ENTIRELY NEW CHUCKERS BY NEW BRITAIN

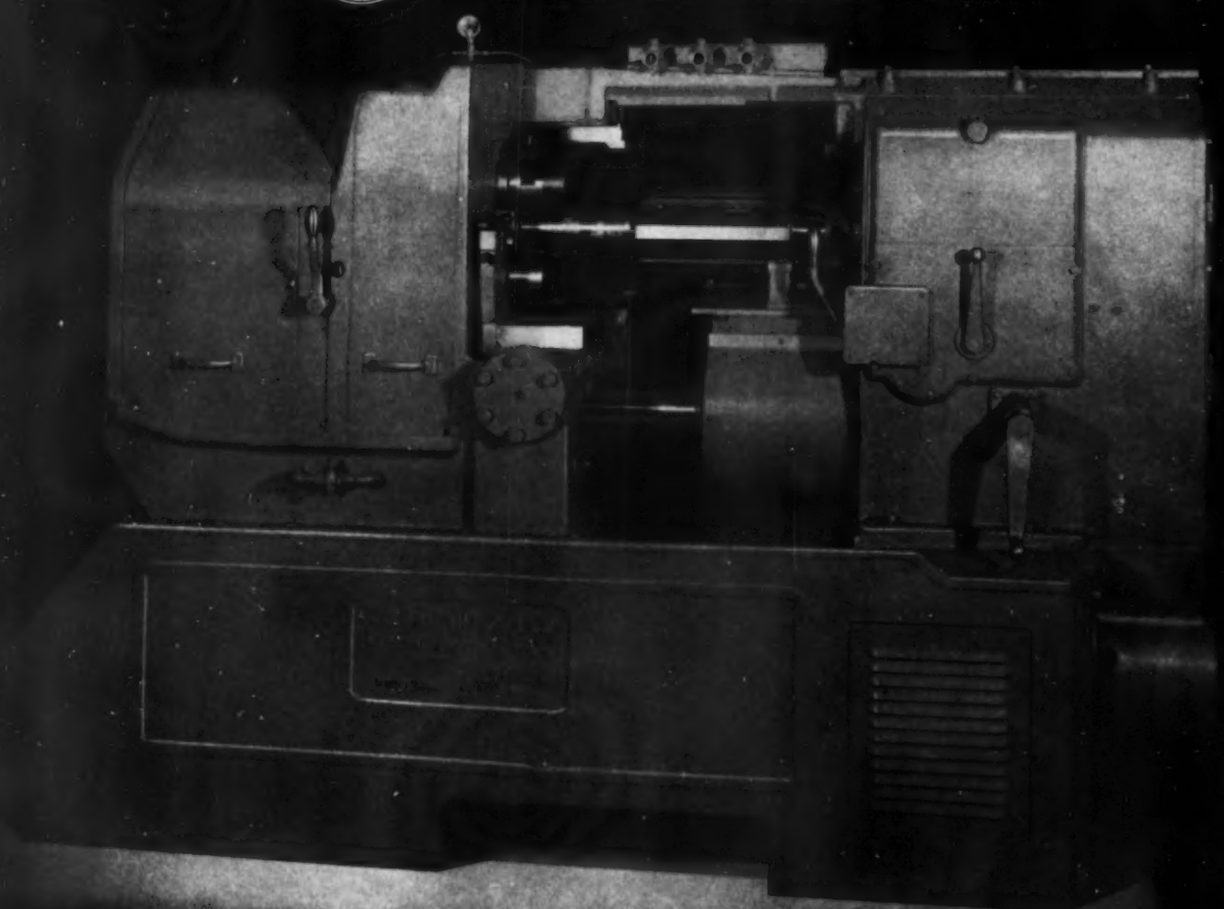
See them at the Show!

SPACE Nº 909

MODEL 14 Four Spindles 6¾" Chucks

also

Model 675 Six Spindles 7½" Chucks



Also look for our New Line of Automatic Screw Machines
4 and 6 Spindles up to 2¼" capacity

THE NEW BRITAIN-GRIDLEY MACHINE COMPANY

NEW BRITAIN, CONNECTICUT, U.S.A.

NOW! Your Opportunity to SEE

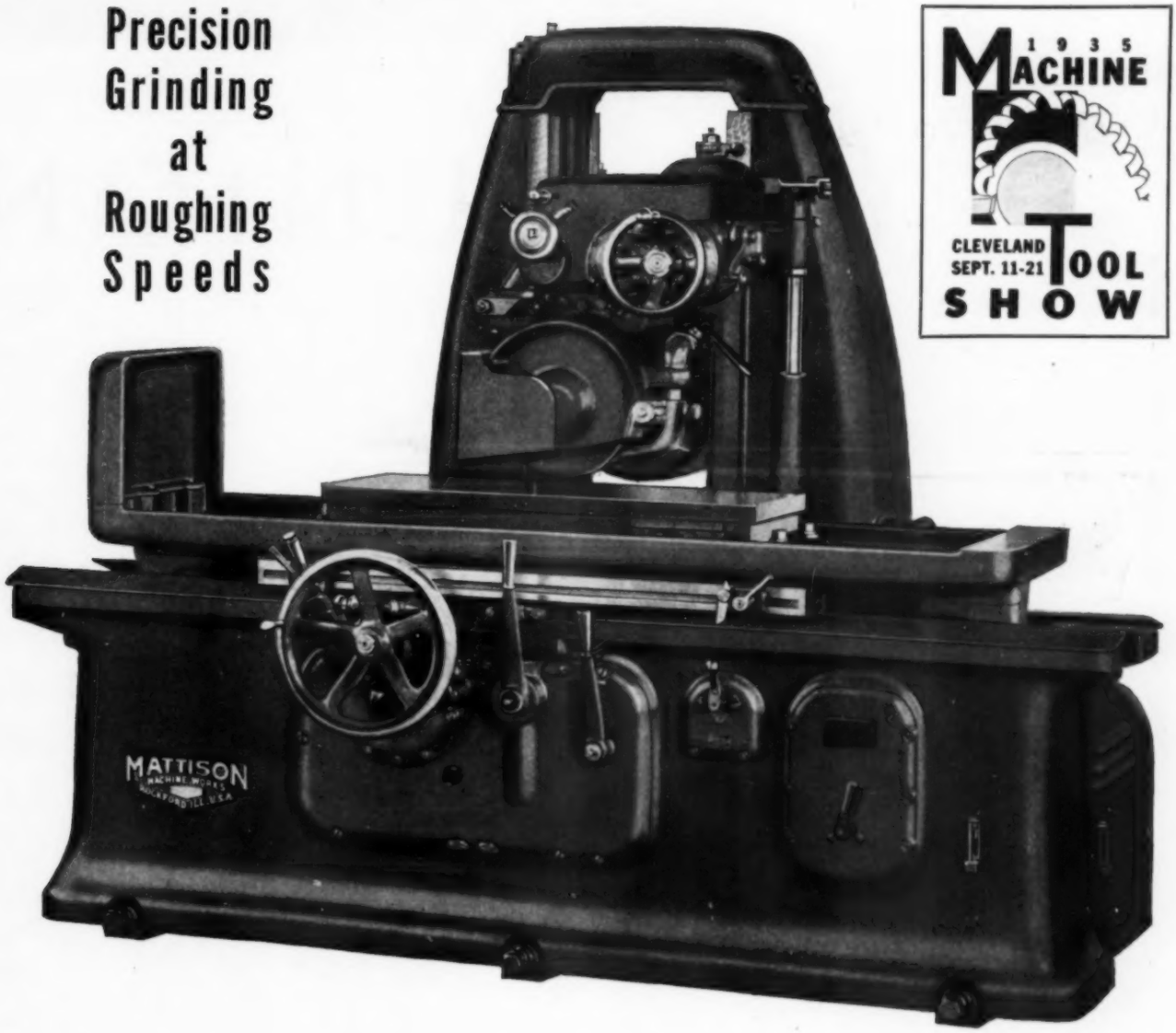
at the SHOW

MATTISON
HIGH-POWERED
PRECISION SURFACE GRINDER

Booth 302

Precision Grinding at Roughing Speeds

1935 MACHINE TOOL SHOW
CLEVELAND SEPT. 11-21

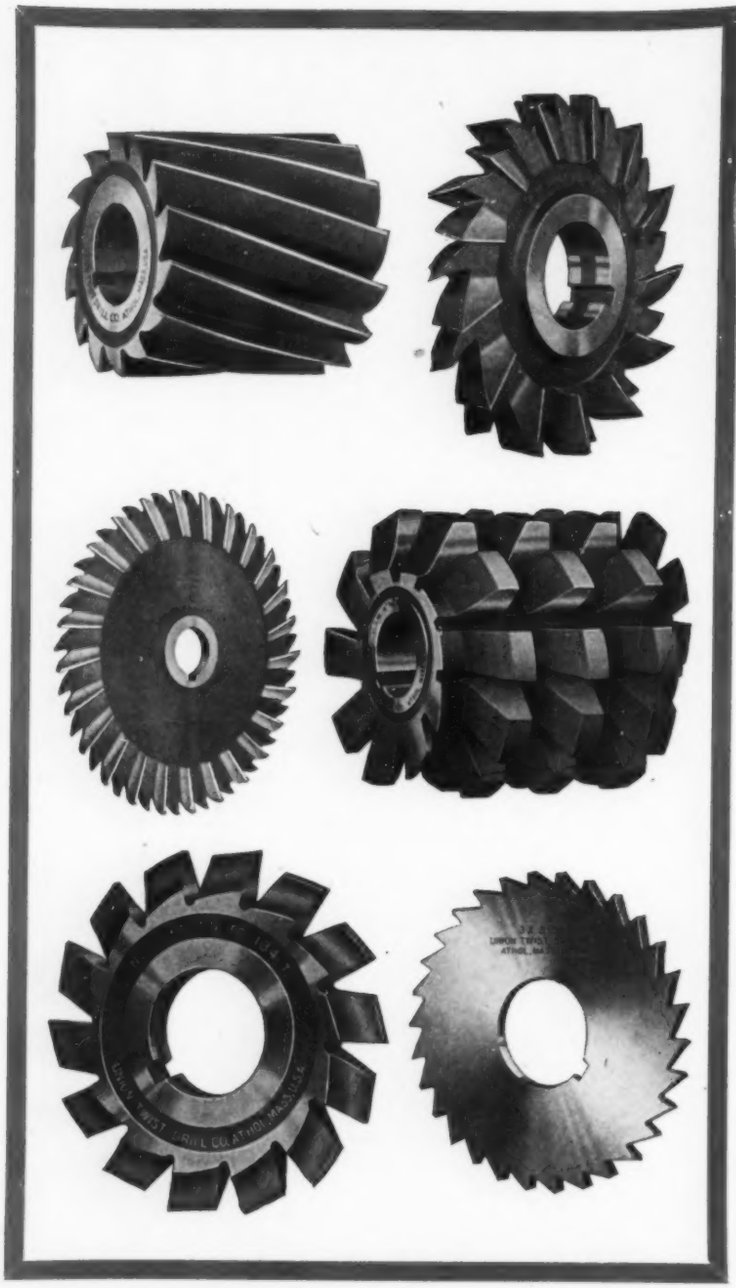


DURING your visit at the Show, see these Mattison High-Powered Precision Surface Grinders in operation.

You will be impressed with the speed at which metal is removed, the exceptionally fine finish and the extremely close limits of accuracy.

These machines will make Surface Grinding contribute more to your profits.

MATTISON MACHINE WORKS—ROCKFORD, ILLINOIS



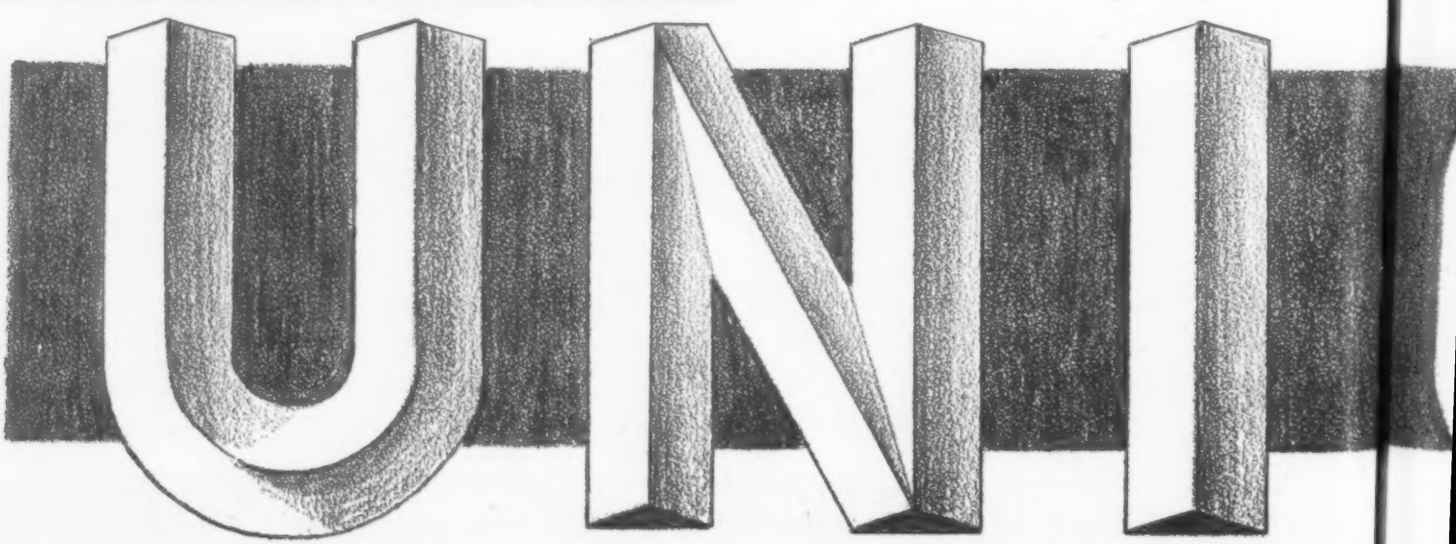
Mach must have TO GIVE THE

UNION

"The Tools You Buy Again"

•

Within the range indicated by the illustrations above (Milling Cutters, Gear Cutters, Slitting Saws, End Mills, Twist Drills, Reamers, etc.) we manufacture



ines

good tools

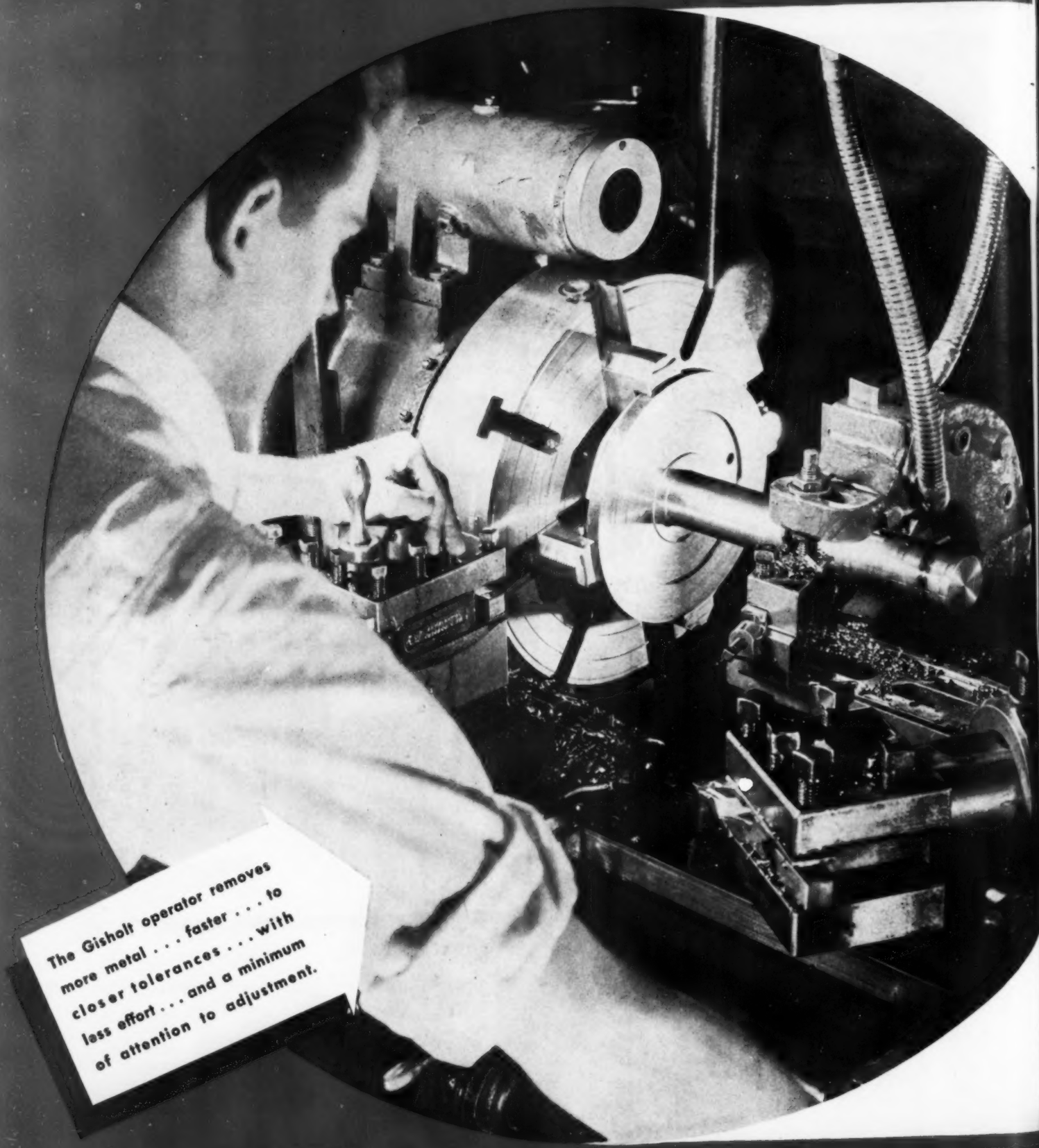
BEST RESULTS

and carry in stock a great variety of modern cutting tools. In addition, through our CARD and BUTTERFIELD Divisions we produce a complete line of taps, dies, screw-plates, etc.

●

UNION TWIST DRILL CO.
ATHOL, MASS., U. S. A.

New York Store: 62 Reade St.
Chicago Store: 11 So. Clinton St.
San Francisco Store: 121 Second St.
Detroit Store: 6540 Antoine St.
S. W. Card Mfg. Co. Division: Mansfield, Mass.
Butterfield Division: Derby Line, Vt. and Rock Island, Quebec
Representatives Throughout the World


The Gisholt operator removes
more metal . . . faster . . . to
closer tolerances . . . with
less effort . . . and a minimum
of attention to adjustment.

GISHOLT MACHINE

Presenting a complete line of

MODERN TURRET LATHES

DESIGNED TO HELP YOU MEET HIGHER PRODUCTION REQUIREMENTS WITH LOWER COST OPERATION

RAM TYPE TURRET LATHES

4 Sizes from 1½" to 2½" bar capacity

HIGH PRODUCTION TURRET LATHES

2 sizes—2½" to 3½" bar capacity

HEAVY DUTY TURRET LATHES

4 sizes—4⅝" to 12¾" spindle bore

SIMPLIMATICS

Automatic Chucking Lathes

STATIC BALANCERS

UNIVERSAL TOOL GRINDERS

DYNAMIC BALANCERS

MODERN TOOLS THAT MEET *MODERN* PROBLEMS

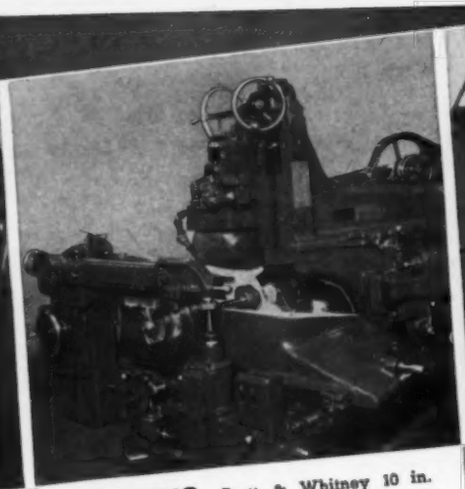
Your problem of stepping up production without adding prohibitively high fixed charges is solved by these modern tools . . . newly designed to give you greater capacity per unit . . . lower fixed and operating costs in the production of round or partly round parts.

SEE THEM IN SPACE 112 • AT THE MACHINE TOOL SHOW

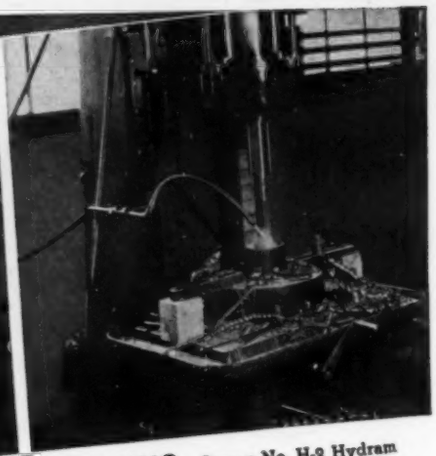
GISHOLT COMPANY

1201 E. WASHINGTON AVE.
MADISON, WISCONSIN
U. S. A.

LATHE WORK. W. & S. 5-A Turret Lathe. Courtesy Warner & Swasey Co., Cleveland.



GRINDING. Pratt & Whitney 10 in. Helical Gear Grinder. Courtesy Buck & Hickman, Ltd., London, Eng.



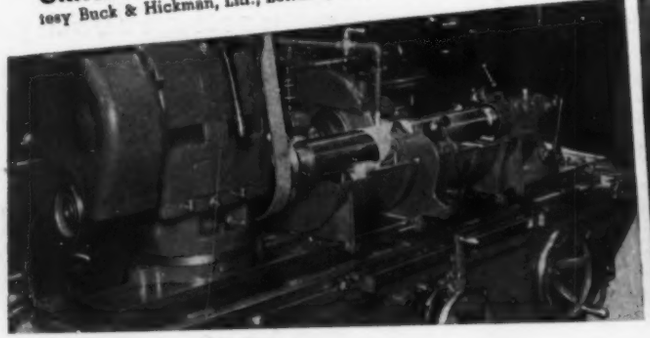
DRILLING. Barnes No. H-2 Hydram Self-Oiling Driller. Courtesy Barnes Drill Co., Rockford, Ill.

Sunoco "has what it takes" to aid machine tools give rated output

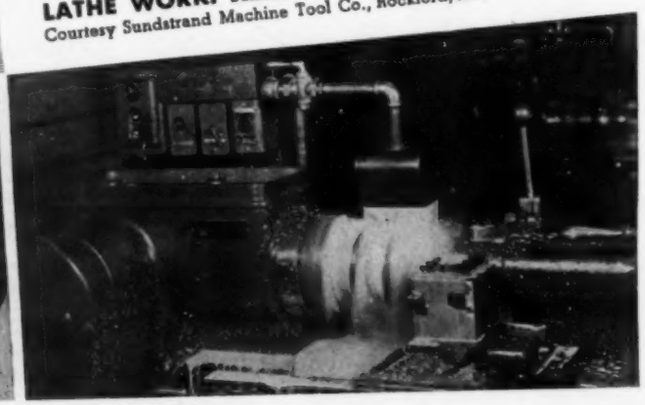
OUTSTANDING PERFORMANCE—OVER MANY YEARS. Check the records of machine tool manufacturers or leading metal cutting plants. You'll find Sunoco on the job . . . chosen for difficult, exacting work. Talk to executives, superintendents, operators . . . you'll learn Sunoco wins preference because it definitely aids in securing rated machine tool capacity.

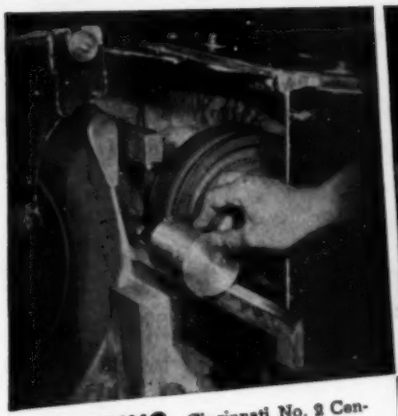
GREATER ACCURACY, EVEN AT HIGH SPEEDS. Sunoco properly lubricates cutting tools, reduces frictional heat, lessens time lost from too-frequent sharpenings. Deeper and faster cuts are made possible—with precision maintained and quality finish assured.

GRINDING. Brown & Sharpe No. 2 Universal Grinder. Courtesy Buck & Hickman, Ltd., London, Eng.



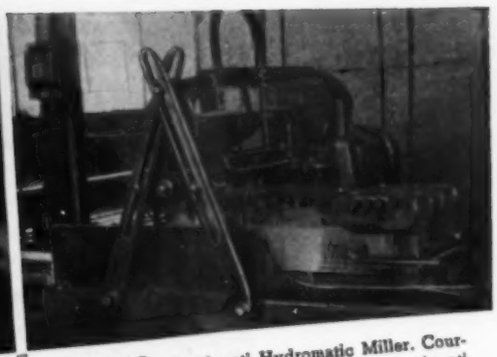
LATHE WORK. Sundstrand 10 in. Automatic Stub Lathe. Courtesy Sundstrand Machine Tool Co., Rockford, Ill.





GRINDING. Cincinnati No. 2 Centerless Grinder. Courtesy Cincinnati Milling Machine & Cincinnati Grinders, Inc.

LATHE WORK. Monarch Magna-Matic Lathe. Courtesy Monarch Machine Tool Co., Sidney, O.



MILLING. Cincinnati Hydromatic Miller. Courtesy Cincinnati Milling Machine & Cincinnati Grinders, Inc.

USED BY LEADING PLANTS. For years we have pictured and described in the trade press, as we do here, operations in leading shops. This series has shown the adaptability of Sunoco, its widespread use, the calibre of the firms who rely on it. Remember—20 years of trade usage stand back of Sunoco!

SUN OIL COMPANY

Philadelphia, Pa.

Sun Oil Co., Ltd., Montreal and Toronto
Sun Oil Co., Ltd., London, Eng.

Test Sunoco . . . Compare It!

We particularly urge a test of Sunoco in your own plant, under your own operating conditions, in comparison with other cutting fluids. Our engineers will gladly assist you.

Correspondence and inquiries are cordially invited.

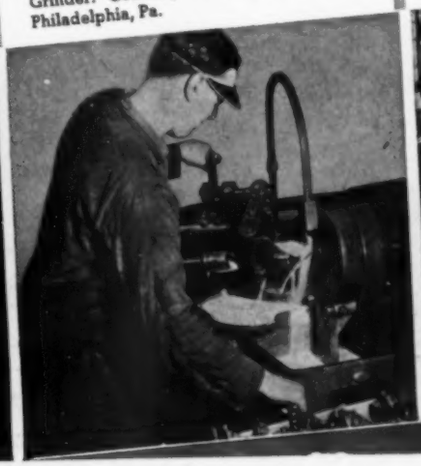
SUNOCO

EMULSIFYING

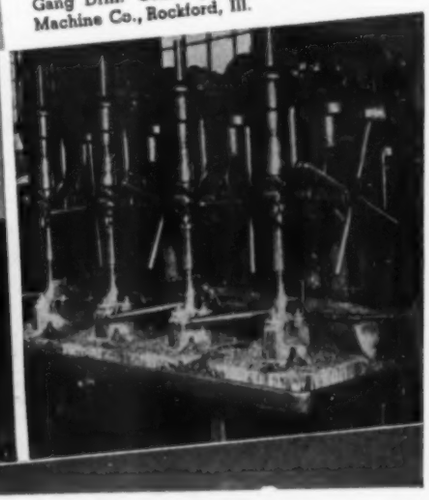
CUTTING OIL

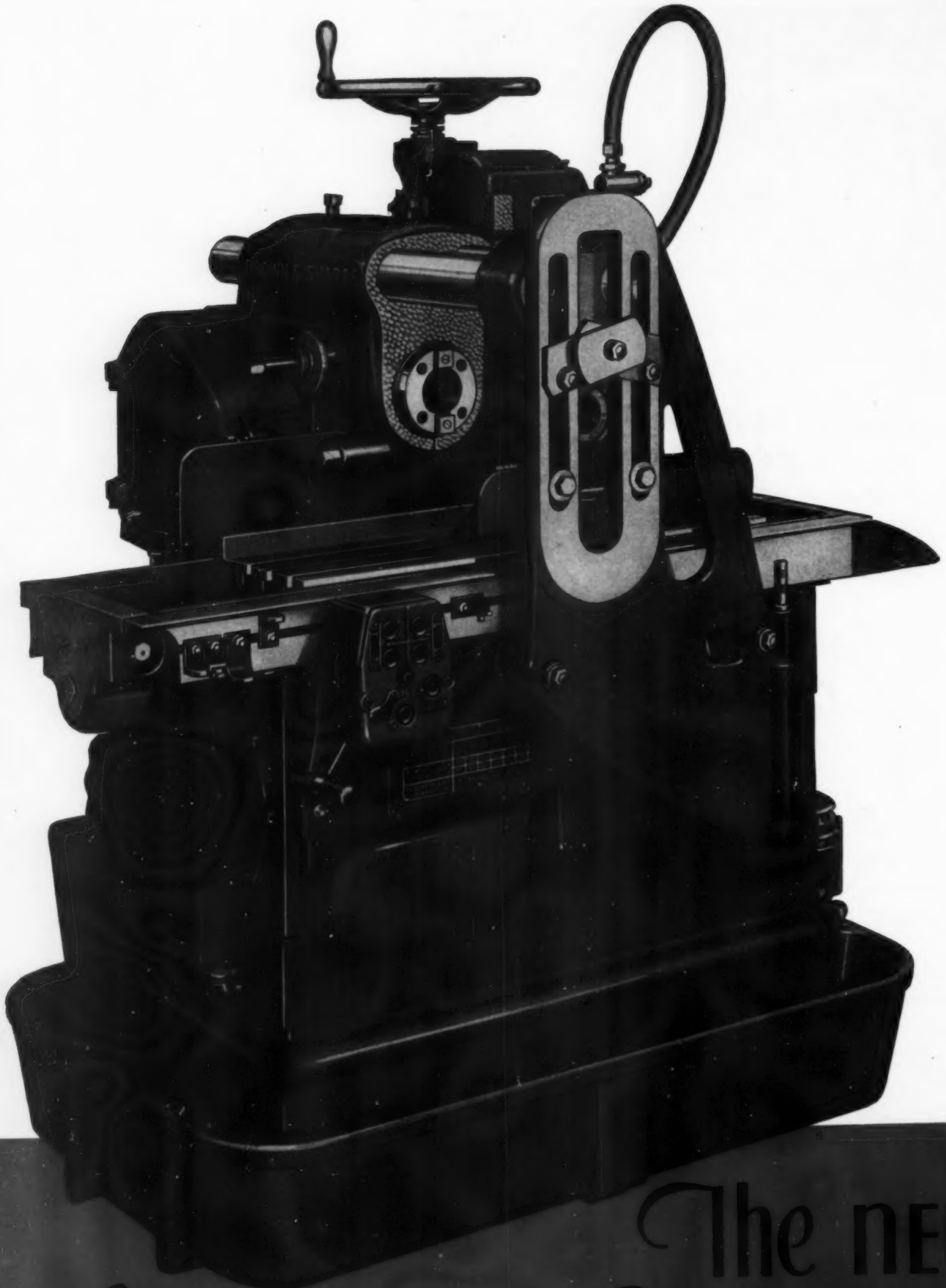
LATHE WORK. Bullard Single—Spindle Vertical Automatic Lathe. Courtesy Bullard Company, Bridgeport, Conn.

GRINDING. Sellers No. 2 B Drill Grinder. Courtesy Wm. Sellers & Co., Philadelphia, Pa.



DRILLING. 26 in. Rockford 4-Spindle Gang Drill. Courtesy Rockford Drilling Machine Co., Rockford, Ill.





The NEW *Electrically Controlled*

Opening a NEW ERA *in* PRODUCTION MILLING

- Complete electrical control of table and spindle movements.
- Automatic backlash eliminator on table feed screw permits "climb" or "hook" milling.
- Dual table feed rates, automatically controlled.
- New rapidity of set-up.
- Unusually complete ranges of feeds and speeds.
- Automatic reverse in cutting feed.

Particularly advantageous for milling with formed cutters in steel.

BROWN & SHARPE No. 12 PLAIN MILLING MACHINE

. . . See it in operation at the Machine Tool Show, Booth 27 — to help you visualize

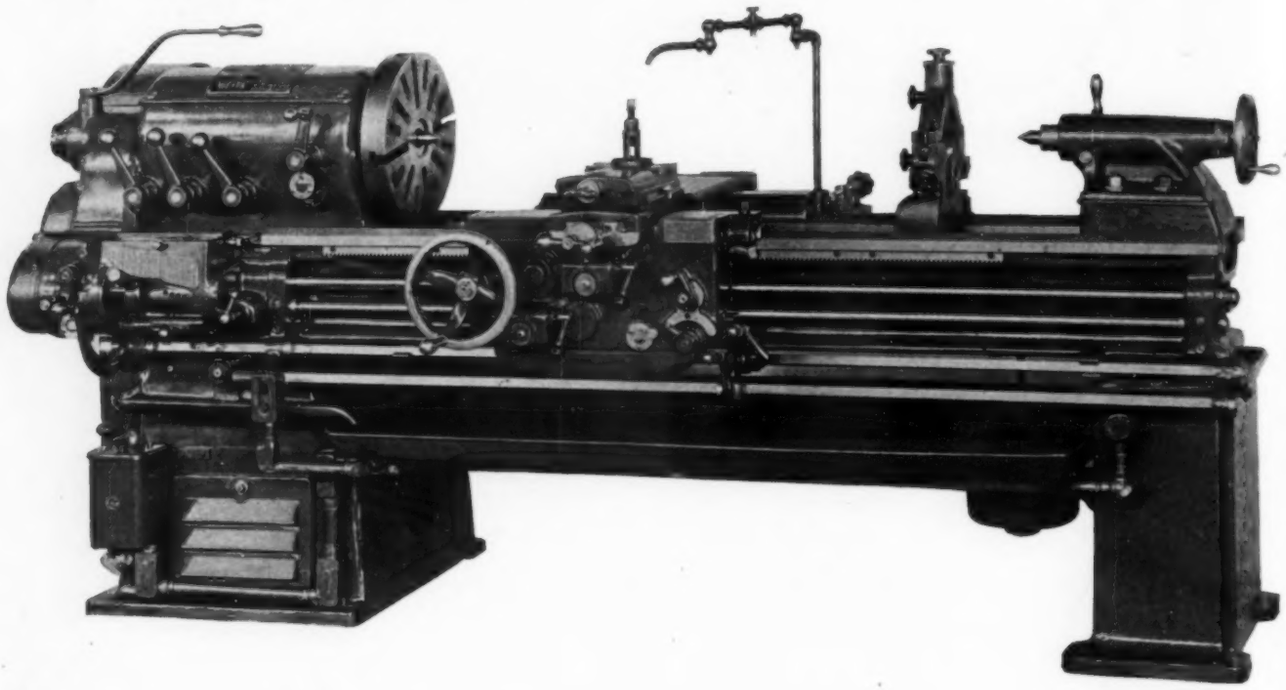
B·S

its production possibilities.

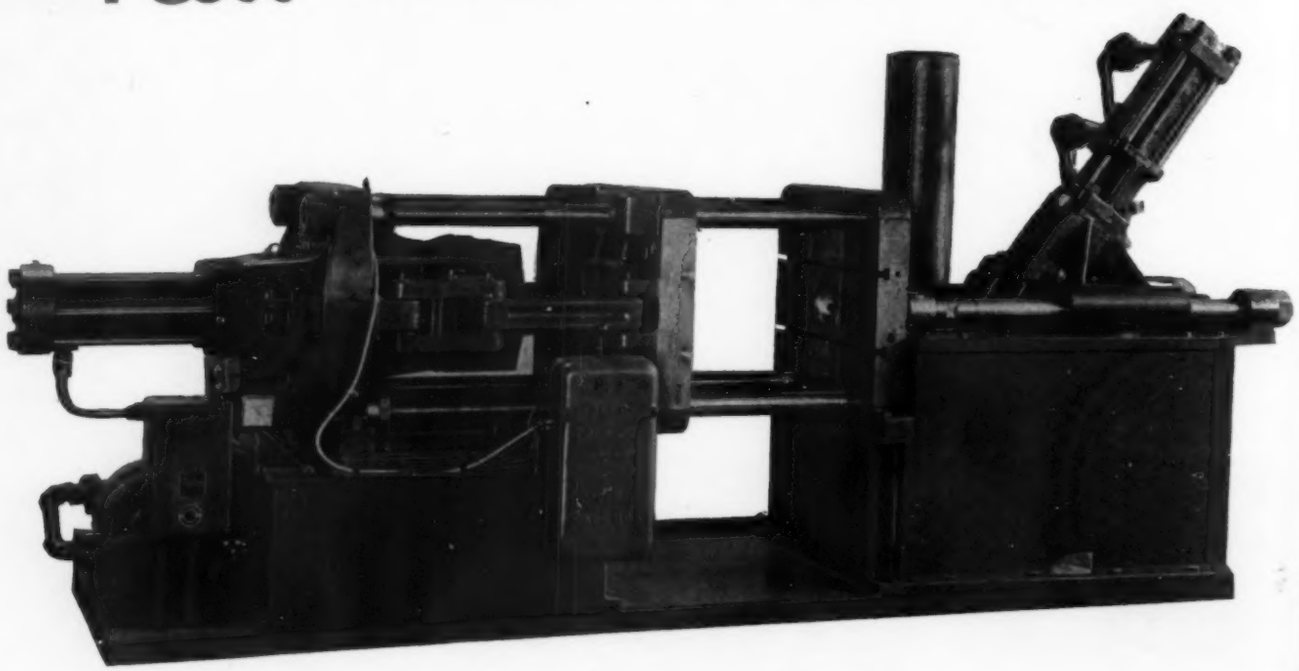
BROWN & SHARPE MFG. CO.
Providence, R. I., U. S. A.

REED-PRENTICE *presents* advanced

This *new* precision TOOL ROOM LATHE



This *new* hydraulic DIE CASTING MACHINE



machine tool design at BOOTH "C"

ALL REED-PRENTICE machine tools shown here represent more than half a century's experience in the design of lathes, vertical millers and die sinkers.

The NEW LATHE and the NEW DIE CASTING MACHINE will be demonstrated for the first time at the Cleveland Machine Tool Exhibit. Each of these machines represents the very latest contribution to the advancement of machine tool practice in Metal Turning and in Die Casting.

Study the features of Reed-Prentice advanced design carefully and call on our engineers to show you how these machines will solve the obsolescence problem in your shop and quickly pay their way in savings.

New Model REED-PRENTICE Precision Tool Room Lathes

Available in sixteen speed 14"—16"—18" and 20" sliding gear sizes. These lathes feature: combined oil pump and splash lubrication to headstock. Hardened chrome nickel steel headstock gears with teeth ground on Pratt & Whitney Gear Grinder. Four bearing TIMKEN precision spindle mounting with anti-friction bearings on back shafts. Anti-friction end works, quick change gear machanism and apron throughout. Forty-nine (49) changes of feeds and threads. Built-in leadscrew reverse mechanism. Apron provided with oil pump for lubrication of all bearings, bed ways and carriage cross slide. Separate clutch control in apron for longitudinal and cross feeds.

NEW REED-PRENTICE Hydraulic Die Casting Machine

But two levers control operation of this hydraulic machine which are interlocked so it is impossible to operate the plunger cylinder until the dies are securely locked. A safety pilot valve eliminates the danger of shooting the metal when dies are open. Operating links and die plates are cast steel. Three sizes are available:

No. 1 with 18" x 20" die plate
No. 2 with 30" x 32" die plate
No. 3 with 34½"x38½" die plate

2V ROUTER and Vertical Milling Machine

Range:			
Longitudinal feed	14"	Weight	1650 lbs.
Cross feed	11"	Spindle speeds	10
Vertical feed of knee	15"		
Maximum spindle to table	17"	With 900 RPM motor	500- 3,000 RPM
Maximum spindle to frame	15"	With 1,200 RPM motor	666- 4,000 RPM
Table working surface	18"x8⅞"	With 1,800 RPM motor	1,000- 6,000 RPM
Rotary table, diameter	15"	With 3,600 RPM motor	2,000-12,000 RPM

3V Vertical Milling and Die Sinking Machine

Range:			
Longitudinal feed, power	21"	Weight	2850 lbs.
Cross feed	12"	Spindle speeds	10
Vertical feed of knee	16½"		
Maximum spindle to table	16½"	With 900 RPM motor	295-1,950 RPM
Maximum spindle to frame	16"	With 1,200 RPM motor	395-2,630 RPM
Table working surface	30¾"x10¼"	With 1,800 RPM motor	600-4,000 RPM
Power feed rotary table, diameter	16½"		

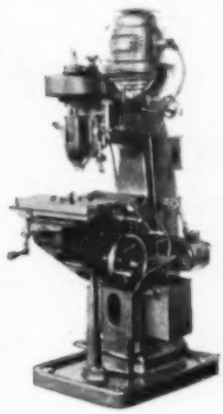
No. 5 Jig Boring and Vertical Milling Machine

Range:			
Longitudinal feed, power	48"	Maximum spindle to table	30"
Cross feed, power	16"	Throat depth	20"
Vertical adjustment head on column	15"	Table working surface	60"x16"
Vertical feed of spindle	9"	Spindle speeds	18 R.P.M. 17-600*

*High speeds can be supplied if desired 34-1,200 RPM

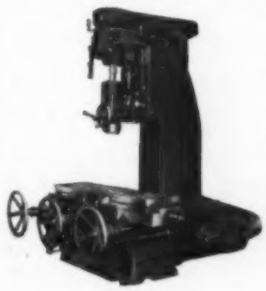
REED-PRENTICE CORP.
WORCESTER MACHINE TOOLS MASS. U.S.A.

Other MODERN MACHINES to be shown



No. 2V ROUTER and VERTICAL MILLING MACHINE

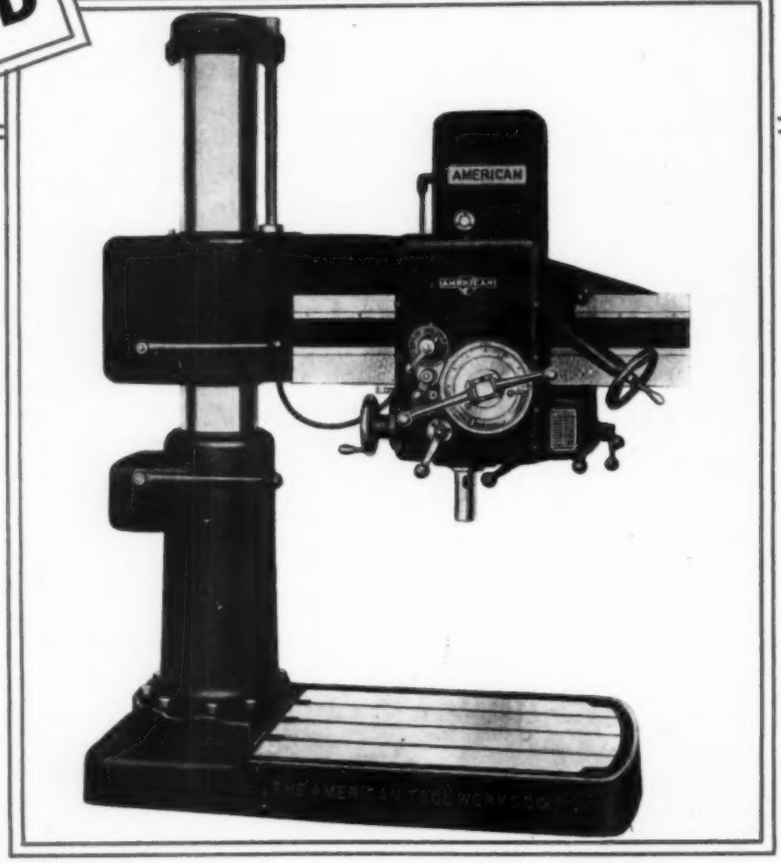
No. 3V VERTICAL MILLING and DIE SINKING MACHINE



No. 5 JIG BORER and VERTICAL MILLER

See these ENTIRELY "American" Achieve

The HOLE WIZARD



A NEW 3-ft. Radial that drills and taps faster than any machine heretofore available at any comparable price. Capacity up to 2" (drilling or tapping) in cast iron, or 1¼" in mild steel.

This ultra-modern machine is of anti-friction construction throughout — *not one plain bearing* — and the entire head mechanism is automatically oiled by means of a pump circulating system which forces oil through a built-in filter, thereby assuring absolutely clean lubrication for the entire mechanism.

Eighteen spindle speeds and six power feeds are under convenient control of the operator — with practically instantaneous reverse, through the use of a 5-hp. built-in. reversing motor.

Many other modern features contribute to the money-making superiority of the HOLE WIZARD, but we can't tell the story here. If you want more holes—and better, faster, tapping for less money, watch the performance of this marvelous machine at Cleveland.

We'll be glad to have you check our production figures against your own

Our exhibit this year at the Cleveland Machine Tool Show will comprise six motor-driven machines—two each, of the three types illustrated above—all of which are either entirely new or greatly improved over the latest previous models. All of these machines will be demonstrated on the basis that their greater productive capacity makes them a highly-profitable investment for any manufacturer who is now using other machines of the same general type.

Machine Tool Foremen, superintendents, or production executives of any kind are cordially invited to inspect these machines—watch the demonstrations—and check our production figures against the best they can accomplish with their present equipment.

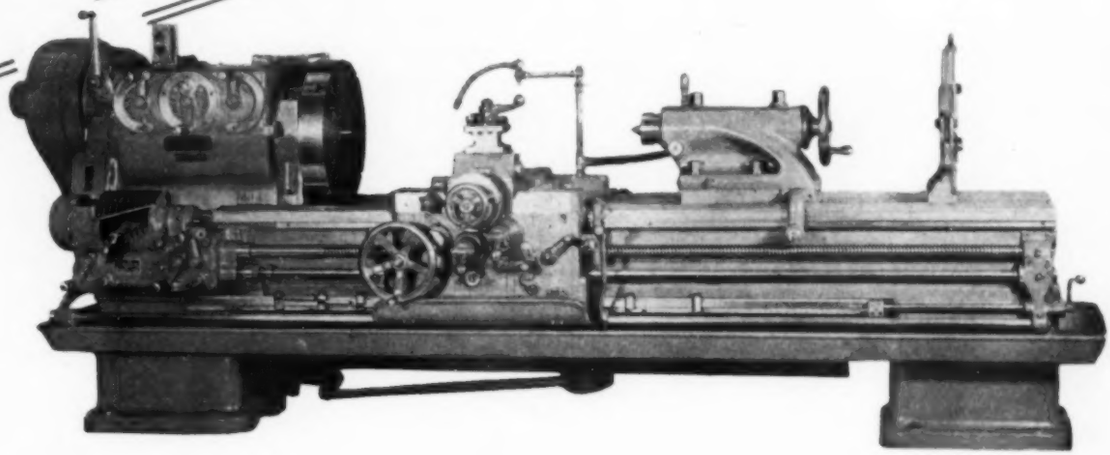
THE AMERICAN TOOL WORKS

NEW

"AMERICAN"

ments..at the.. **CLEVELAND SHOW BOOTH NO. 901**

The **MULTI-PRODUCTION LATHE**



THIS new addition to the "American" lathe family meets an important need by filling the gap between the standard engine lathe and the highly specialized, single-purpose, automatic lathe. It retains the same adaptability and range as a standard lathe while through its combination of automatic length stops, positive diameter stops, and special tooling, it also offers facilities for very rapid production of duplicate parts.

In considering the cost-cutting possibilities of the new "American" Multi-Production Lathe for your own production requirements, remember that it is built and powered for utilization of cemented carbide cutting tools to their utmost limit. Enormous power, complete absence of vibration, a patented perfected chip-breaker, and a copious flow of coolant on the cutting tool, permit heavy cuts at high speed without the slightest danger of injury to either the work, the tool, the machine or the operator.

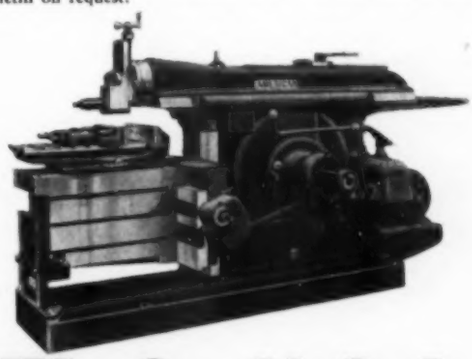
Whether or not you see this machine at the Cleveland Show, you should have the complete illustrated bulletin which describes it. Write today, for bulletin No. 444.

.... and don't overlook the

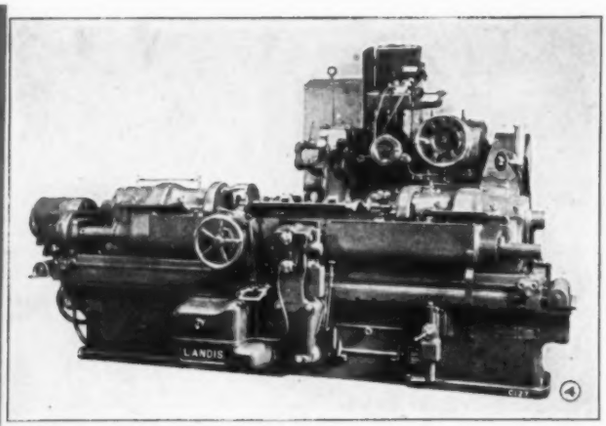
AUTO-OILED SHAPER

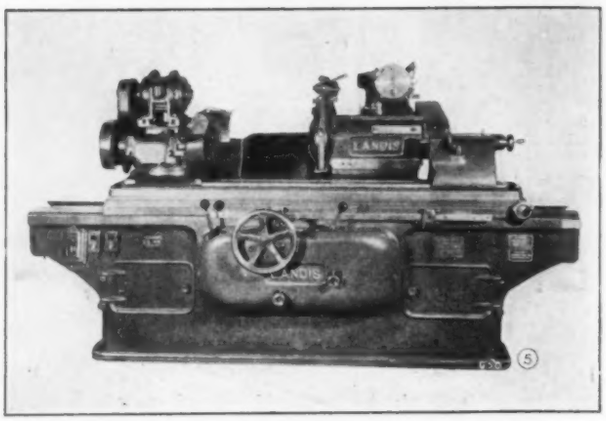
IN measuring the productive capacity of any shaper its ability to remove metal is the most essential factor. The new "American" Auto-Oiled Shaper cuts metal at an amazing rate. For example, the 32-inch machine will cut .60 carbon die-block steel at the rate of 8.2 cu.in. or 2½ lbs. per minute. Without the slightest difficulty it will use the full capacity of a 15-hp. motor, and will continue to operate at that rate for long periods without any indication of distress.

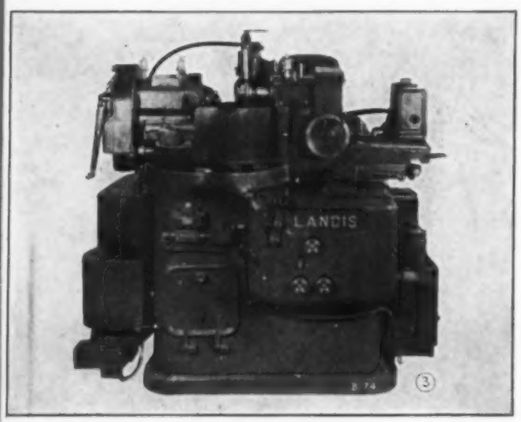
We believe that it will produce approximately 60% more work in a given time than any 10-year old shaper. Watch its performance at Cleveland, and check our figures. Bulletin on request.

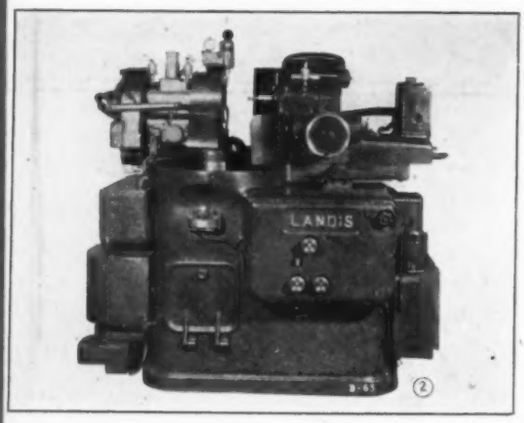


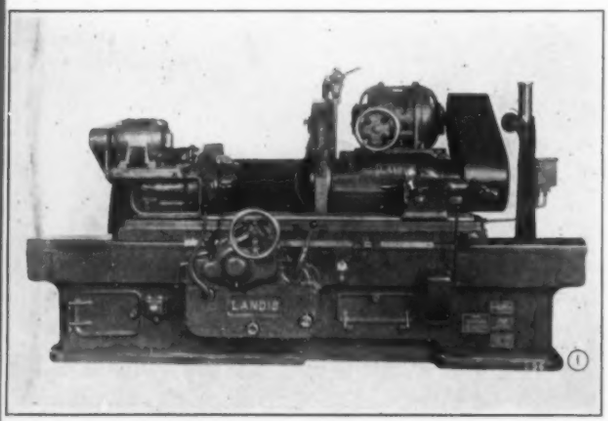
COMPANY, CINCINNATI, O., U.S.A.











NE

When you attend the Machine Tool Show you will see ten cost reducing, product improving grinders in action at the Landis booths. All of them are recent developments. Several have not been shown or even announced before.

The following machines will be included in the exhibit:

(1) 14″x48″ Type D Plain Hydraulic Grinder

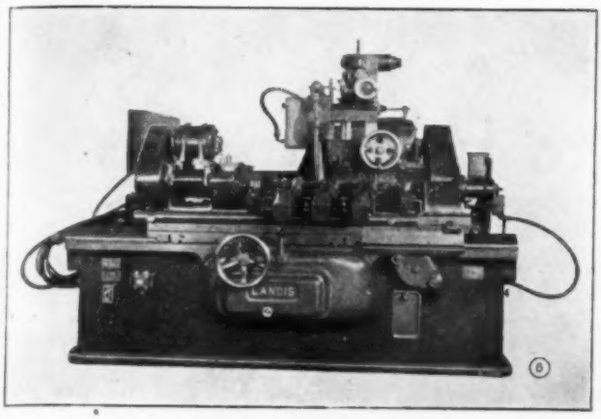
(2) 3½″ Hydraulic Internal Race Grinder

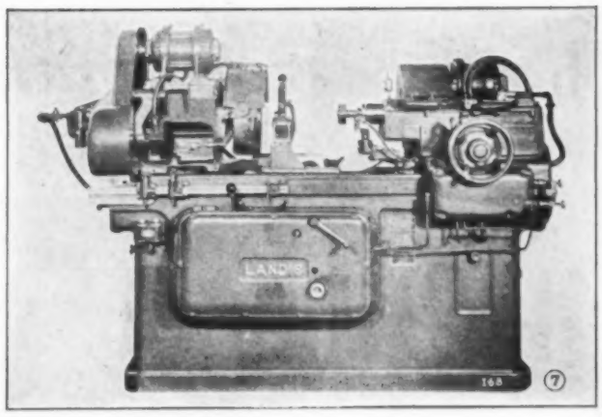
(3) 5″ Hydraulic External Race Grinder

(4) 16″x42″ Type D Hydraulic Crank Pin Grinder

(5) 14″x36″ Type C Hydraulic Universal Grinder

LANDIS
Waynesboro,





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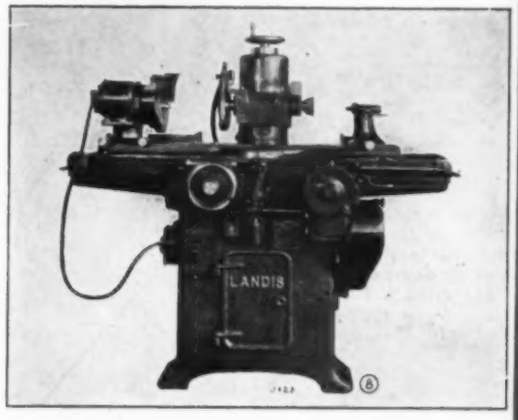


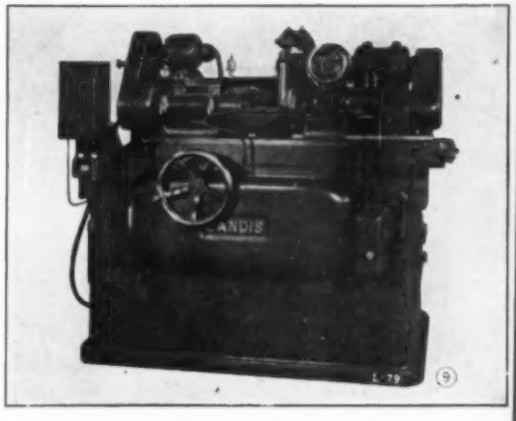
(6) 10″x36″ Type C Semi-automatic Hydraulic Grinder

(7) 15″x8″ Type C Hydraulic Internal Grinder

(8) 12″x32″ Tool and Cutter Grinder

(9) 6″x18″ Type C Plain Hydraulic Grinder

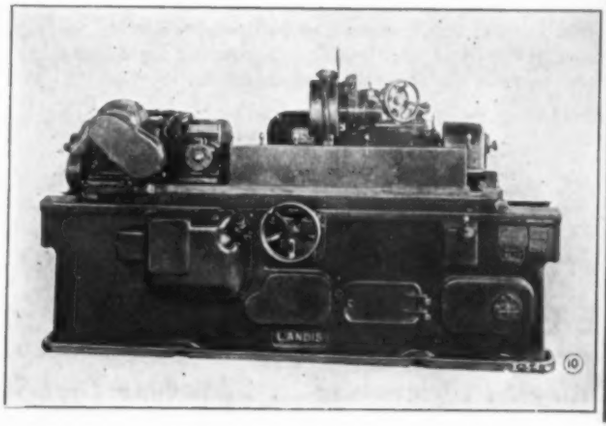
(10) 5″x40″ Type D Hydraulic Cam Grinder



After you have seen this array of Landis grinders you will be convinced that there is ample opportunity for the reduction of costs and improving of quality in *your* grinding department.

By all means attend the Show and, while there, don't miss the Landis exhibit. You will find it in Booths J and K in the Arcade.

Ad. 202



TOOL CO.
Pennsylvania

Where *Performance* is Forged into High Speeds

Old time hammermen have the patience to put real performance in Vasco steels. They have the eye and the technique to know when the bar stock is "right."

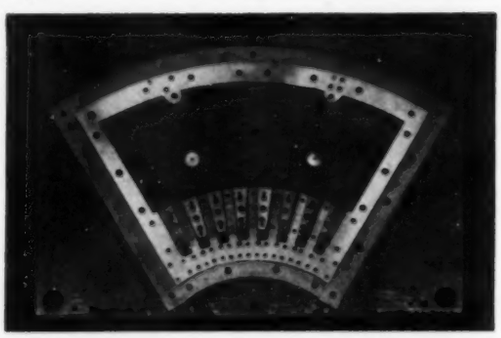
3¼" reduction on this .50 carbon forging in one cut (or should we say deep bite!). 15 foot speed ¼ inch feed. An every day performance for this fine old reliable High Speed Tool Steel.

Red Cut Superior

Red Cut Superior is a high speed steel of the 18% tungsten, 4% chromium, 1% vanadium type. Combined with the correct chemical composition are the proper casting temperatures, correct ingot size, proper and sufficient reduction in forging, close rolling tolerances, proper annealing, rigid and thorough inspection at every stage of manufacture.

Red Cut Superior is a nationally known High Speed Tool Steel.

Consult yellow classified telephone directory for nearest branch where complete data is available.



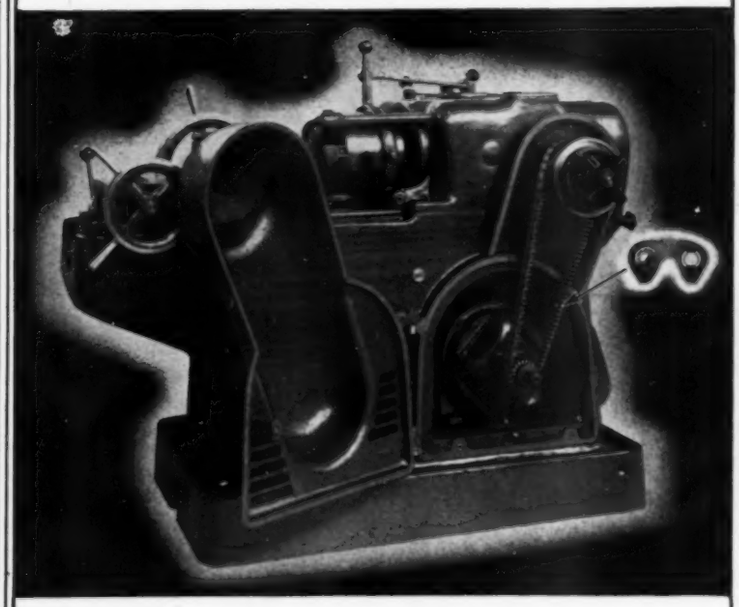
For this intricate segmental die Red Cut Superior was selected because of its superior uniformity. Every piece over a period of years will be identical with other pieces. This die had finished a run of over a million when photographed.

VANADIUM-ALLOYS STEEL CO. LATROBE, PA.

Exhibiting . . . Cleveland . . . Machine Tool Show September 11 to 21

LANDIS MACHINE COMPANY

Another one of the many famous builders of American machine tools using the Silent Chain Drive.



SILENT CHAIN EQUIPPED

DURABLE
EFFICIENT
EASILY APPLIED

LINK-BELT

5384

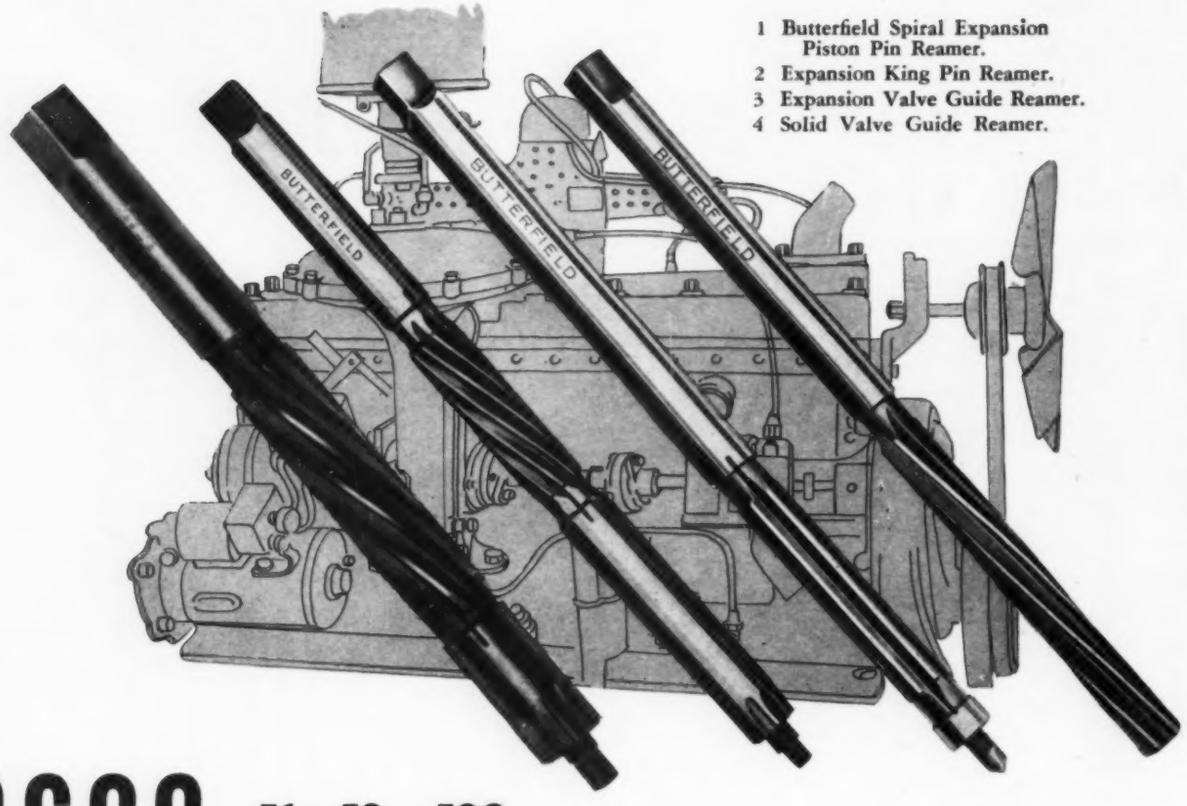
LINK-BELT COMPANY

The Leading Manufacturer of Positive Power Transmitting Equipment

INDIANAPOLIS CHICAGO PHILADELPHIA ATLANTA SAN FRANCISCO TORONTO

Offices in Principal Cities

SEE OUR EXHIBIT AT THE MACHINE TOOL SHOW — SPACE E-302 — CLEVELAND, SEPTEMBER 11-21



1 Butterfield Spiral Expansion Piston Pin Reamer.
2 Expansion King Pin Reamer.
3 Expansion Valve Guide Reamer.
4 Solid Valve Guide Reamer.

3600 r.p.m. *Without Vibration!*

If the reciprocating parts of a modern automobile engine operating at full power were exposed to view no human eye or brain could register an adequate impression of their motion. Yet these tremendous speeds are maintained for long periods of time, under heavy load, without excessive friction or vibration.

Many factors enter into the successful solution of such a difficult engineering problem, but one indispensable requirement is that sleeves, bearings and wrist pins shall have no more clearance than is necessary for an oil film to prevent actual metal-to-metal contact.

The extensive use of Butterfield Reamers by manufacturers of automobile engines to meet such rigid requirements, is the best possible evidence of their uniform accuracy and economical performance.

MANY types of ButterfieldR eamers have been developed especially for automotive requirements — others have proved their value in every phase of modern machine shop practice. All have keen, accurate, ground-after-hardening edges, and extra strong centers which stand up under the heaviest cuts. Produced in a shop where full advantage is taken of every advance in steel-making, heat-treating, and precision manufacturing, they save their cost many times over where long-sustained accuracy is essential.

Actual demonstration, in your own shop is our favorite way of proving the extra service life of Butterfield Reamers. Just telephone, or drop a line, to our nearest store.

UNION TWIST DRILL COMPANY

BUTTERFIELD DIVISION

DERBY LINE, VERMONT ROCK ISLAND, QUEBEC

STORES: New York, 62 Reade St. Chicago, 11 So. Clinton St. Cleveland, Hal. W. Reynolds, 3346 Superior Ave. Detroit, 1050 Mt. Elliott Ave. Toronto, 49 Main St., Mimico. Montreal, 111 St. Paul St., West. Agents for Great Britain—Charles Churchill & Co., Ltd., 27-34 Walnut Tree Walk, Kennington, London, S. E. 11, England. Branches at Birmingham, Manchester, Glasgow, Newcastle-on-Tyne and Bristol.

Save with selected fluids . . . **1**

Where Cooling is more Important than Lubrication

WHEN the work demands mostly a *coolant*, rather than lubricant, danger creeps in—the danger of rusting the parts in process. Yet, it's only good sense, for economy's sake, to keep water proportions safely high.

Careful selection of Soluble Oils and intelligent control of oil-water proportions are vital.

Men in your local Standard Oil (Indiana) office are experienced and always ready to help you *save the most with safety* on every operation.

Use Standard fluids, and challenge your Standard Oil friends: "go ahead and *show me* a saving!"

Copr. 1935, Standard Oil Co.

STANDARD PRODUCTS

***SUPERLA SOLUBLE OIL** is easily mixed with water, stable in storage, and permits wide variations of concentration.*

also . . .

ACME OILS (Dark Colored—4 grades)
PREMIER OILS (Light Colored—2 grades)
ACME BASE OILS (2 grades)
STANOSTAMP
STANDARD CUTTING COMPOUND (a soluble paste)

and . . .

cutting fluids compounded with animal and vegetable oils, forge die lubricants, etc.

STANDARD OIL COMPANY (INDIANA)

CORRECT LUBRICATION

Practical answers to the lubrication problems met in metal working will be found in the booklets listed in the coupon at the right. Check those you desire, and attach a list of any other problems on which helpful information would be welcome right now.

Stop at Booth S-4, in the Arena Section, at the Machine Tool Exposition. Standard Oil (Indiana) Engineers will be there, ready to discuss problems with you, glad to make helpful suggestions.

(166)

Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago, Illinois
Gentlemen: Kindly send copies of the papers checked to the undersigned. It is understood that no obligation is implied.

☐ "Quenching and Tempering Oils" ☐ "Metal Forming Lubricants" ☐ "Lubrication in Grinding Operations" ☐ "Lubrication in Gear Cutting Operations"
☐ "Lubrication in Honing & Lapping Operations" ☐ "The Lubrication Engineer—His Value to You" ☐ "How to Cut Costs Through Correct Lubrication in Difficult Cutting Operations"
(attach list of any additional subjects in which you are specifically interested . . . . . .)

Name .....

Position ..... *Company* .....

Address .....

City ..... *State* .....

"...not to copy...but to contribute"

It was in the year 1899, shortly after Edward Kearney and Theodore Trecker had started in business, that a friend said to them, "You are just beginning . . . if you want to make a success of building milling machines —copy the products of your competitors."

Mr. Kearney replied, "We are not in business to copy — but to contribute."

It was this spirit that spurred Kearney & Trecker to develop the first all-geared milling machine, the world famous double overarm, the first automatic flooded lubrication—and scores of other engineering achievements that have advanced the practice of milling.

Recent developments include the introduction of higher spindle speeds, the super-precision Hypoid bevel gear dividing head, and the successful application of Tungsten and Tantalum Carbide to production milling.

At Cleveland we will exhibit a complete new line of Milwaukee Milling Machines — machines which mark another milestone in engineering progress — another contribution to faster and more efficient milling.

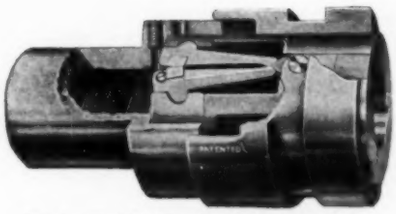
SPECIALISTS IN ONE LINE OF PRODUCTS—MILWAUKEE MILLING MACHINES

KEARNEY & TRECKER CORPORATION

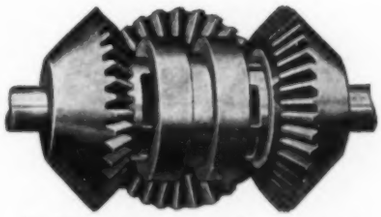
More than thirty-six years of doing one thing well!

THE JOHNSON FRICTION CLUTCH

Let JOHNSON *do it*



Single Clutch Showing Working Parts



Double Clutch Between Bevel Gearing

The Simplest Way to Solve Your Clutch Problem Is to Turn It Over to Our Engineering Department . .

For over thirty years The Carlyle Johnson Machine Co. has specialized in designing and building Friction Clutches to meet the varied requirements of builders of machinery used in all branches of industry; Machine Tools, Wood-working Machinery, Bottling and Packaging Machines, Machinery for the Textile, Paper, Rubber, Drug and Chemical, Leather, Road-building, Construction Industries, and many others too numerous to list in detail.

Johnson Friction Clutches set the Standard for Line Shaft Installations. Our experience has proved that Johnson ideals of perfection in Friction Clutch Manufacture, have been rewarded by the satisfaction of our users with the efficiency, dependability, and long-wearing qualities of **Johnson Clutches.**

Double Clutch Exterior

During the past five years when manufacturers have been compelled to get all possible utility from their equipment, **Johnson Clutches** which in some cases had been in actual use for 25 years or more, have been reconditioned and returned to their users still good for many years of faithful service.

WRITE FOR "BLUE" CLUTCH CATALOG

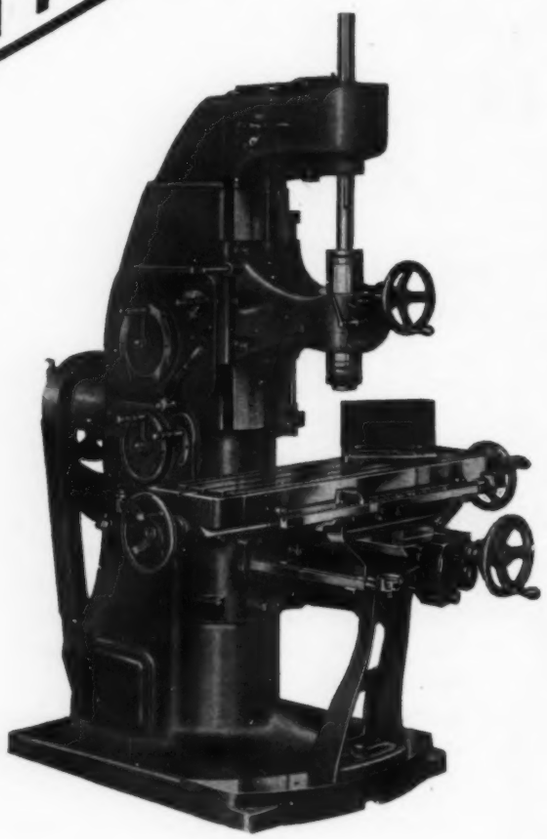
THE CARLYLE JOHNSON MACHINE CO.

MANCHESTER, CONN.

"SPECIALISTS IN FRICTION CLUTCH DESIGN"

The versatile KNIGHT MILLER—

at the Show, Booth 19



The adaptability of this miller to such a wide variety of work quickly appeals to all who seek a multi-purpose machine to cut production costs. Handling efficiently die, jig, tool, experimental and limited production work, its profit-making ability and possibilities are unsurpassed.

The tilting and swiveling table of the Knight Miller makes possible many different angular milling, boring and facing jobs without resetting the work. This feature together with the Dial Indicator equipment which eliminates much layout work puts the tool room and experimental shop on a production basis.

Powerful, sturdy and precise, the Knight Miller is always busy, often saving investment in expensive special machines. For many years over 40% of Knight Miller sales have been repeat orders from leaders in the industry—based on known performance.

See the KNIGHT MILLER in operation at Cleveland or send for catalog with full description.

W. B. KNIGHT MACHINERY CO.
St. Louis, Mo.

✓ CHECK the many operations performed by a KNIGHT MILLER

- ☐ Face and Angle Milling—Quickly and easily accomplished—just tilt the table.
- ☐ Tool Room Work—Tilting and Swiveling Table simplifies set-up. Greater accuracy and versatility makes it ideal for this work.
- ☐ Experimental Work—Costs reduced by machining many jobs complete on one machine.
- ☐ Jig Boring—With Dial Indicators, quick and accurate without the use of buttons or other time-consuming methods.
- ☐ Die and Mould Work—Roughing and finishing difficult forms easily, quickly with minimum adjustments.
- ☐ Limited or Special Production—The Tilting Table with Dial Indicators acts as universal jig and fixture—eliminating costly special tools.

FREE ON REQUEST

REEVES presents a new reference book on variable speed control—the most complete and helpful book on this subject ever published.

Handy in size and serviceably bound in blue cloth stamped in gold, this new Handbook contains 112 pages and more than 200 illustrations.

Regardless of the type of product you manufacture, this Handbook will be of interest and value to you. It gets right down to the brass tacks of variable speed control—what it is—how it is engineered and applied—and the remarkable advantages it offers. This book is written out of the experience of REEVES engineers in applying infinite speed adjustability to more than 75,000 machines and in assisting over 1100 machine builders to incorporate speed control as standard equipment.

Every production executive, purchasing agent, machine designer and plant superintendent should have a copy. Since this book is being distributed free only to those who request it, we suggest that you fill out and mail the convenient coupon at right.

REEVES VARIABLE SPEED TRANSMISSION

Many NEW FEATURES in this Handbook

Here are a few of many new features that make it important for you to have this Handbook:

- The requirements of modern speed control equipment—a valuable check list to use in selecting the most efficient methods and units.
- Description and pictorial presentation of the complete line of REEVES Speed Control Equipment—designs, controls, speed ratios, sizes—developed to meet the specific requirements of hundreds of machines and manufacturing processes.
- H. P. ratings and speeds stepped up on REEVES Variable Speed Transmissions, providing greater capacity per unit.
- Hydraumatic Control—a new hydraulic automatic control of high sensitivity and positiveness operating from extremely slight indicating movement.
- Improved endless cord V-belt giving greater strength and capacity, longer life, to this vital part.
- New type frame construction enabling easier installation or removal of V-belt and other operating parts.
- Improved electric remote and automatic controls with more compact mounting of control equipment.
- Force-feed lubrication system on open design REEVES Transmissions.
- Complete data on the REEVES Vari-Speed Motor Pulley, the efficient, simplified unit for direct installation on motor shaft.
- Engineering data in convenient form for reference—tables for selecting correct size and class (speed range) of REEVES Transmission for any machine application. Complete dimension diagrams of various REEVES designs, efficiency charts, etc.

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Columbus, Indiana

Please send FREE copy of your new Speed Control Handbook A-35.

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ANOTHER MODERN MACHINE TOOL

Powered by

MODERN WESTINGHOUSE DRIVE

Dependable Westinghouse Motors and Control provide this high-speed Warner & Swasey Universal Turret Lathe with plenty of power, smoothly and accurately controlled.

★ ★ ★

For driving today's modern high-speed machine tools, Westinghouse motors and control have the stamina that comes from quality materials and workmanship, *plus* exclusive design features resulting from years of cooperative engineering with leading machine tool builders.

Westinghouse provides *complete* Electric Drives specially designed for machine tools. Motors and control, a-c. or d-c., from the smallest fractional horsepower ratings to the largest capacities required; switches, Nofuze Circuit Breakers, relays and electric brakes; and an experienced staff of Westinghouse engineers is available to work with machine tool builders and their customers on individual problems.

Ask for complete information about the many special features of Westinghouse machine tool drives. And when you buy modern, efficient tools, specify WESTINGHOUSE DRIVES.

B-52068

★ A CORDIAL INVITATION ★

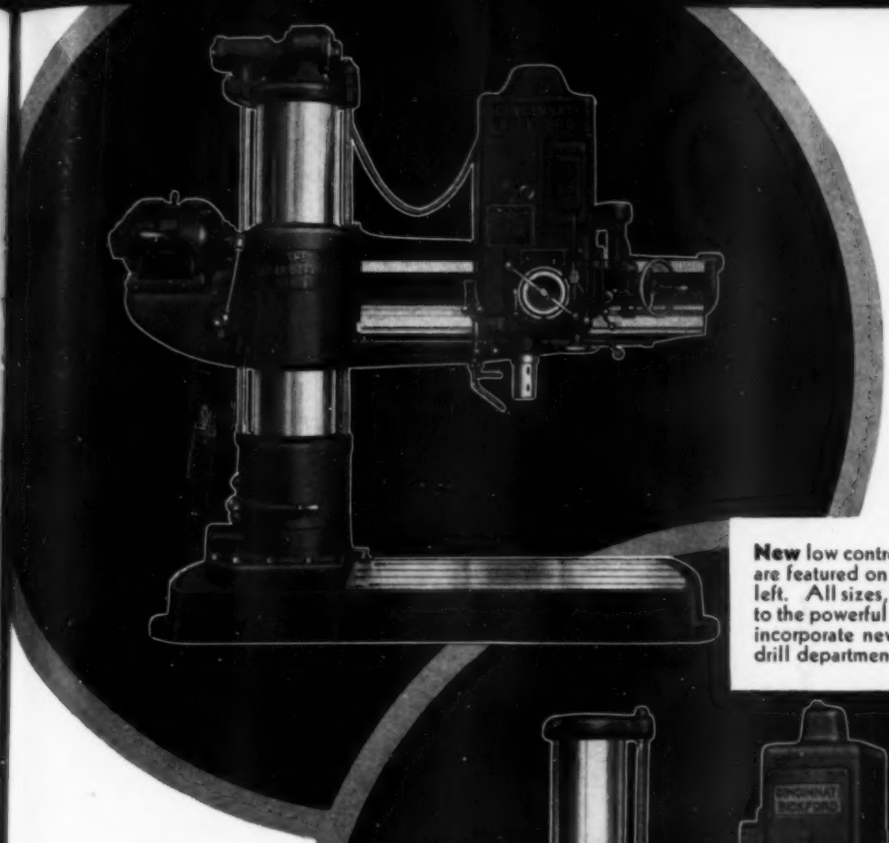
We invite you to visit our exhibit at the Machine Tool Show. See the newest electric drives for machine tools! Simplified methods of motor mounting! And make our exhibit your headquarters while at the show. Booth E-304.

A GOOD MACHINE IS WORTHY OF A GOOD DRIVE—

Specify **Westinghouse**

Look at All Three

EACH HAS NEW COST CUTTING FEATURES



New low controls centralized 100% at the operating position are featured on the line of Super-Service Radials shown at the left. All sizes, from the 4' machine with 13" diameter column to the powerful 12' arm machine having 26" diameter column, incorporate new improvements that will save money in your drill department.

New High Speed 3' and 4' Super-Service Radials will provide a speed range to suit your work no matter how small your drilling. All speeds and feeds changed by sliding gears with single lever control at the head. Balanced head and arm move on antifriction bearings for the ultimate in fast, easy handling.

The most important machines in your shop include your radial and upright drills. New savings are possible with the recent Cincinnati Bickford developments. Features to give you "more holes per dollar" will be shown in **Booth 406** at Cleveland. If you don't attend, keep posted by writing for our latest catalogs.

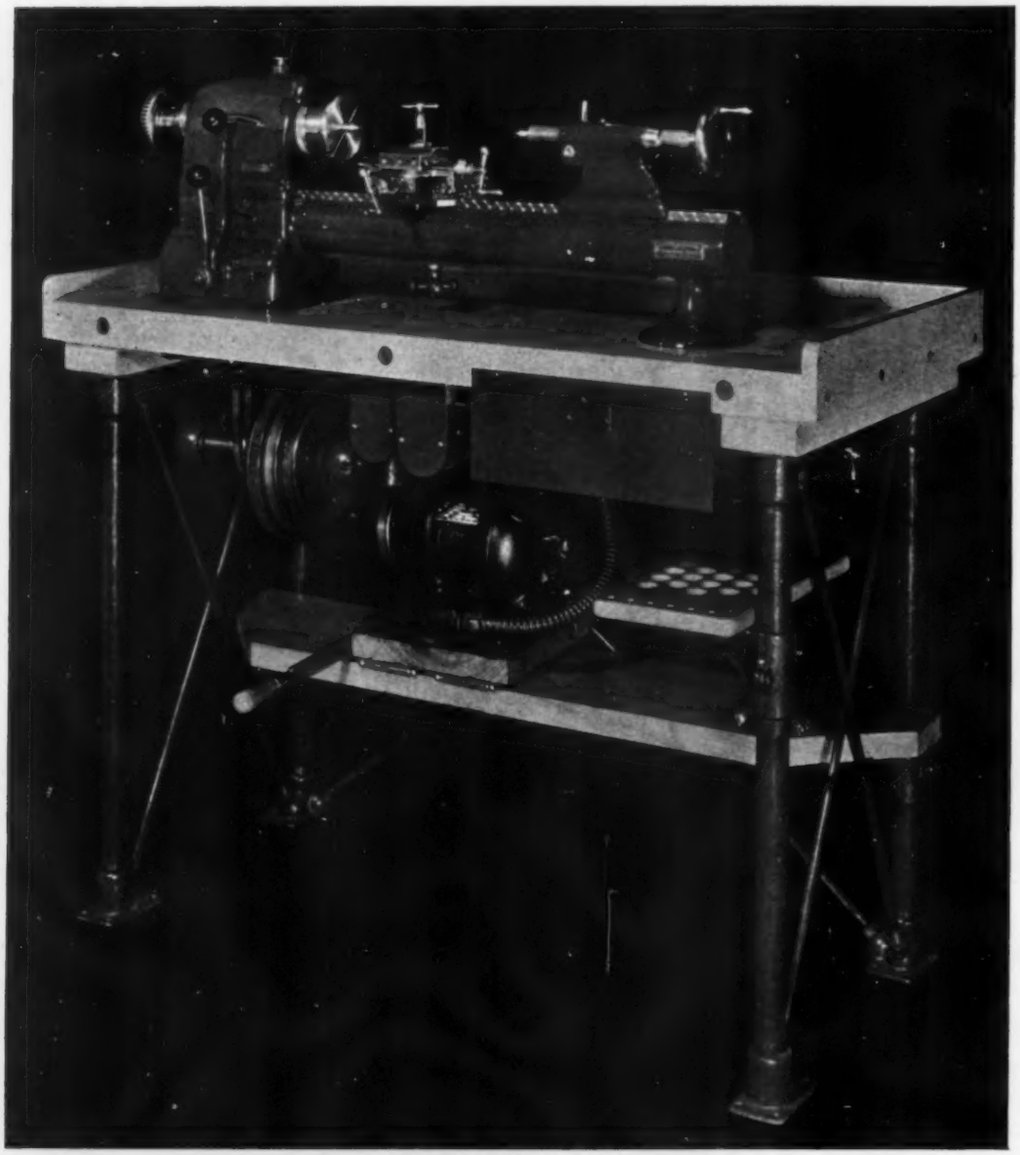
21" and 24" and 28" Super-Service Uprights, round and box column types, set a new standard for convenience, stamina, accuracy and general production efficiency. One modern improvement is the elimination of all friction clutches. Be sure to get details of this new design.

The Cincinnati Bickford Tool Company

Oakley, Cincinnati, Ohio, U. S. A.

MODERN DEMANDS

HARDINGE ENCLOSED HEAD PRECISION BENCH LATHE with "CONNECTED BEARINGS"



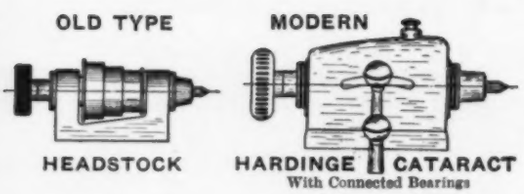
A complete modern Bench Lathe Unit combining:

- Accuracy
- High Spindle Speeds
- Lever Speed Control
- Rugged Construction
- Connected Bearings
- Collet Capacity to 1"
- Modern Electric Drive
- Six Speeds Forward
- Six Speeds Reverse
- Vee Belt Connected
- No Installation Cost

To meet present day efficiency requirements.

Write for Descriptive Literature AL

HARDINGE *Cataract* PRECISION



Created These New Machines

HARDINGE MOTOR DRIVEN M D 5 PRECISION MILLING MACHINE

A modern, rugged milling machine for tool-room work.

Ease of operation and high spindle speeds, combined with extreme accuracy, make this machine necessary in the modern tool-room.

Enclosed vee belt drive with conveniently located lever speed control gives six forward and six reverse spindle speeds.

SPECIFICATIONS:
Longitudinal travel 12", Transverse travel 6½", Vertical travel 7½". Centers swing 6" diameter.

Write for Descriptive Literature AM

HARDINGE
PRECISION MACHINE TOOLS
SINCE 1890

ELMIRA - CHICAGO - DETROIT - NEW YORK
Sales Representatives in all Principal Cities

HARDINGE BROTHERS, INC. . . . ELMIRA, N. Y.

MONARCH WILL OFFER

See the Monarch EXHIBIT . . .

THE Monarch Exhibit, at the National Show, is certain to arouse widespread interest and enthusiasm . . . because it will point the way to new standards of efficiency and economy. Monarch Machines have always been progressively modernized . . . until, today, they represent the very last word in productiveness, in economy, and profit-making ability. Plan now to see the Monarch Exhibit, because many of the machines that will be on display are so new, so different, in both design and construction, that they will positively amaze you. These machines will be on display at the Monarch booth:

ENGINE LATHES

1 12" x 30" 16-speed lathe, in operation, powered with a 5 H.P. motor. This is the smallest machine in the Monarch line.

2 14" x 30" 16-speed Monarch model "AA" lathe, equipped with new diameter and length stops, and tooled on a production chucking job similar to a large number of such lathes which have been placed in use during the last year or more.

3 16" x 30" Monarch model "W" lathe equipped with 7½ H.P. motor. This lathe is a new addition to the Monarch line.

4 18" x 48" Monarch model "BB" 16-speed helical geared Timkenized lathe equipped with 7½ H.P. motor. This lathe incorporates many new time-saving improvements only recently developed by Monarch.

5 20" x 48" Monarch model "M" 16-speed helical geared Timkenized lathe with a 15 H.P. motor. It is equipped with all the latest time saving features and will be used, for the most part, on large diameter motor shaft production.

6 24" x 60" Monarch model "N" Helical geared Timkenized 16-spindle speed lathe with 20 H.P. motor.

7 30" x 60" Monarch model "NN" heavy duty lathe, 16-speed helical geared Timkenized powered with a 30 H.P. motor. This is another new addition to the Monarch line.

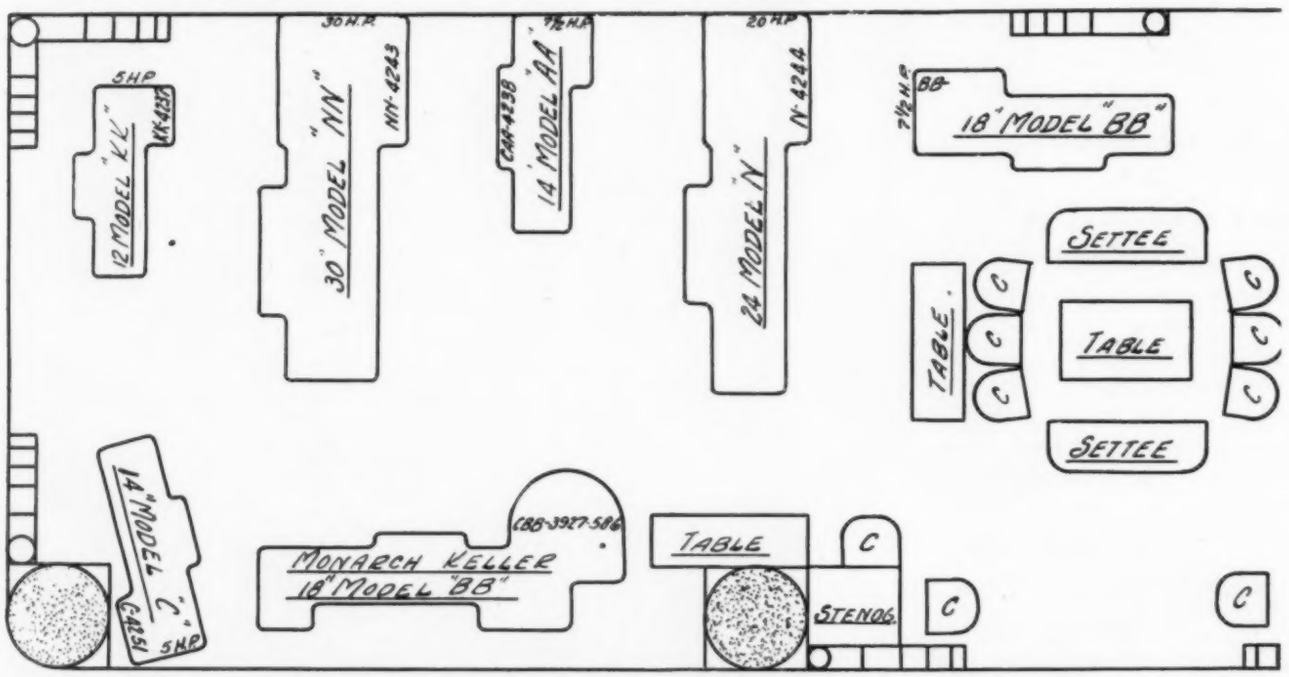
MONARCH TOOL ROOM LATHES

8 12" x 30" 16-speed helical geared Timkenized tool room lathe, with all the latest features.

9 14" x 30" model "C" 16-speed helical geared Timkenized tool room lathe with every new feature.

10 16" x 30" Monarch helical geared Timkenized tool room lathe equipped with 5 H.P. motor and many new and improved features.

11 18" x 48" model "C" helical geared Timkenized complete tool room lathe. The Monarch Centrode Device and Oval Chuck for turning innumerable shapes other than round, will be featured on this machine.



THE MONARCH MACHINE TOOL COMPANY, Sidney, Ohio, U. S. A.

New York Sales Office: 413 Graybar Bldg.

Monarch Lathes

Helical Gears - Timken Bearings

SMOOTHER . . QUIETER . . MORE POWERFUL

Chicago Sales Office: 622 W. Washington Blvd.

MANY SURPRISES
AT THE NATIONAL SHOW!

12 14" x 30" Monarch Magna-Matic double carriage automatic lathe with a 10 H.P. motor. This lathe will be shown on automatic step shaft turning. It will not only feature the rapid floor-to-floor production of step shafts, but will also feature the quick set-up in changing from one job to another.

13 14" x 18" Magna-Matic Double Carriage Automatic Lathe, tooled for multiple tooling. It will be shown on production jobs to demonstrate not only the ease of tooling on this newest of automatic lathes, but also the rapid floor-to-floor production obtained.

14 Monarch 12" x 18" simplified Manufacturing Type Lathe. This machine will be shown, for the first time, at the Cleveland Show. This is an extremely simple, yet very rugged and powerful manufacturing type lathe equipped for semi-automatic production and with rear facing carriage when desired. The lathe will be powered with a 5 H.P. motor, but will handle up to 10 H.P. It is of such a unique design that all accessory units can be applied to the lathe in the customer's plant should they be required at any time in the future. Its unique, simple design, and the extremely low price, at which it will be offered, are sure to make this lathe one of the sensations of the Show!

15 18" x 48" Monarch Keller Automatic Form Turning and Boring Lathe in actual operation. This is the machine with the "Electric Brain" that has created such a sensation all over the world since its introduction four years ago.

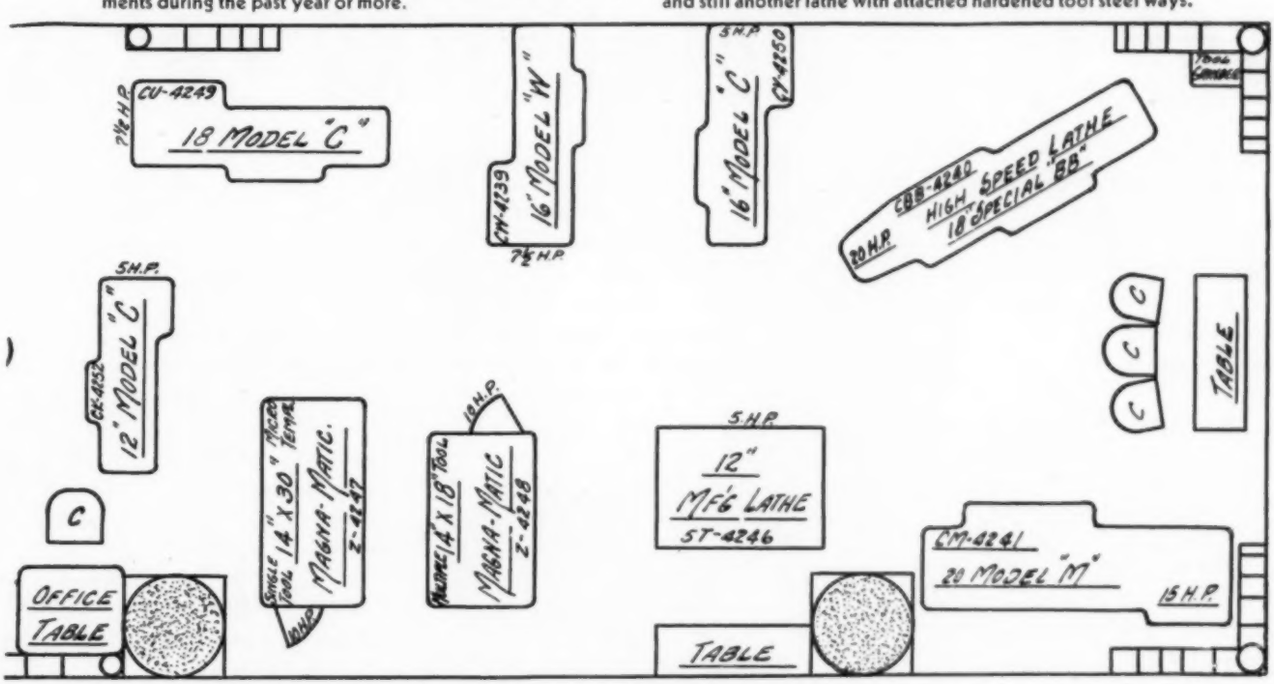
16 18" x 48" model "BB" Shaft Turning Lathe, equipped with a 20 H.P. motor and a speed transmission unit inside the headstock leg, giving a very wide range of spindle speeds. This lathe has been developed solely with the idea of handling the new Tantalum Carbide turning tools on steels to their limit. It will be operated at spindle speeds as high as 2000 R.P.M. and will be shown machining motor shafts on a production basis.

The new Cam Lock will be shown for the first time. It will be furnished as regular equipment on all sizes of Monarch Lathes — from 12" to 18", inclusive, for quickly clamping chucks, plates and fixtures to the flanged spindle nose.

Monarch's new Diameter and Length Gauging Dials, which eliminate "cut and try" in lathe production, will be featured on all Monarch lathes shown. This is an entirely new Monarch development, and has been most enthusiastically received by those few lathe users who have had an opportunity of seeing it during the past few weeks. We consider this feature one of the most outstanding Monarch developments during the past year or more.

All Monarch lathes shown at this Exhibit will be equipped with Monarch Automatic Force Feed Lubrication to bed ways, tool slides, and aprons.

In line with Monarch's policy of constant pioneering and research, the result of the past several years of development in better materials for lathe beds will also be shown. In addition to showing the regular semi-steel, nickel, chromium lathe beds, there will also be on display, at the Monarch Exhibit, a hard chromium plated lathe bed . . . an all welded steel lathe bed with welded tool steel ways . . . and still another lathe with attached hardened tool steel ways.



THE MONARCH MACHINE TOOL COMPANY, Sidney, Ohio, U. S. A.

New York Sales Office: 413 Graybar Bldg.

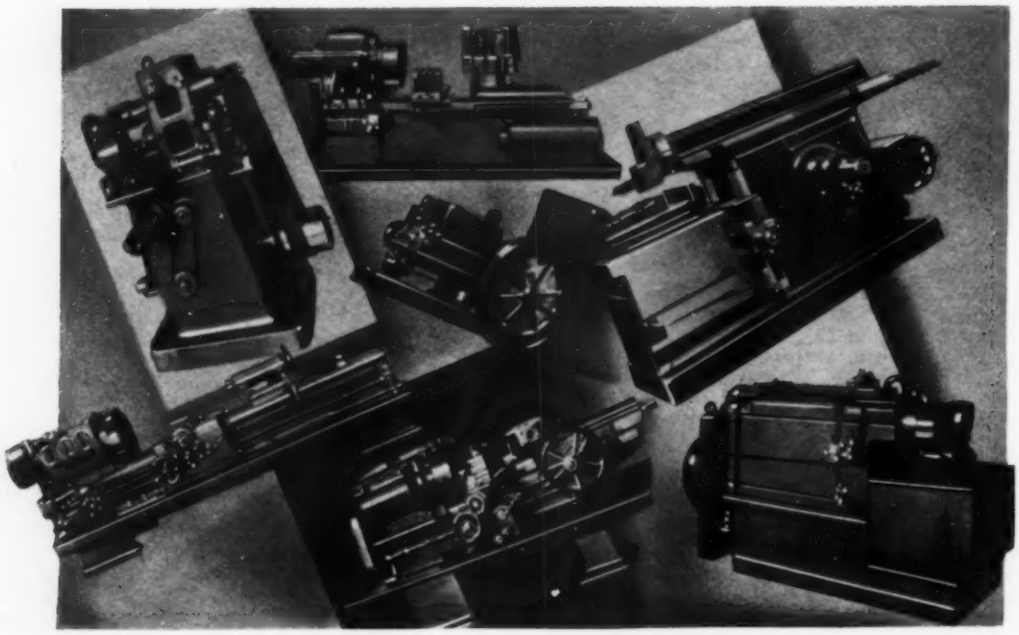
Monarch lathes

Helical Gears - Timken Bearings

SMOOTHER..QUIETER..MORE POWERFUL

Chicago Sales Office: 622 W. Washington Blvd.

You Can Buy the New Machines You Need Now



FOR LOWER OPERATING COSTS

Modern machines can now be purchased for lower cost manufacturing more economically with MGD (Modern Group Drive) than with individual motors. MGD is constantly reducing capital and operating costs in many plants.

What is MGD?

It is the system of transmitting power, using, as conditions warrant, many and various means of applying driving power to driven machines to achieve always "the most economical and efficient use of power." It is tailored to fit your every production requirement for labor, material handling and power, not merely to accommodate the physical dimensions of a building.

MGD utilizes the diversity of load factors of all the machines in a production unit to secure the lowest possible power cost, to obtain the most efficient use of the power applied, to reduce the initial cost of applying power to machines, and to minimize maintenance expense.

MGD actually cuts production costs, and therefore demands your immediate investigation. It is not a simple commodity sold over the counter; it is one of the most recent results of cooperative industrial research. The application of MGD principles requires a conscientious study of your particular production problems.

But, 3500 Power Transmission Counselors will assist you in making your analysis. They are cooperating daily with plant engineers, consulting engineers and public utility engineers all over the country to reduce power costs. They will gladly serve you, without obligation. Meanwhile, send for a free copy of the famous Red Book, "A Practical Analysis of Some Fundamentals of Industrial Power Transmission." It will give you food for thought.

POWER TRANSMISSION COUNCIL
1 Atlantic Street, Stamford, Conn.

A research association of producers and distributors of power, power units and mechanical equipment for the transmission of power

MODERN GROUP DRIVE PTC

A POWER DOLLAR SAVED IS A PROFIT DOLLAR EARNED

FOOTBURT

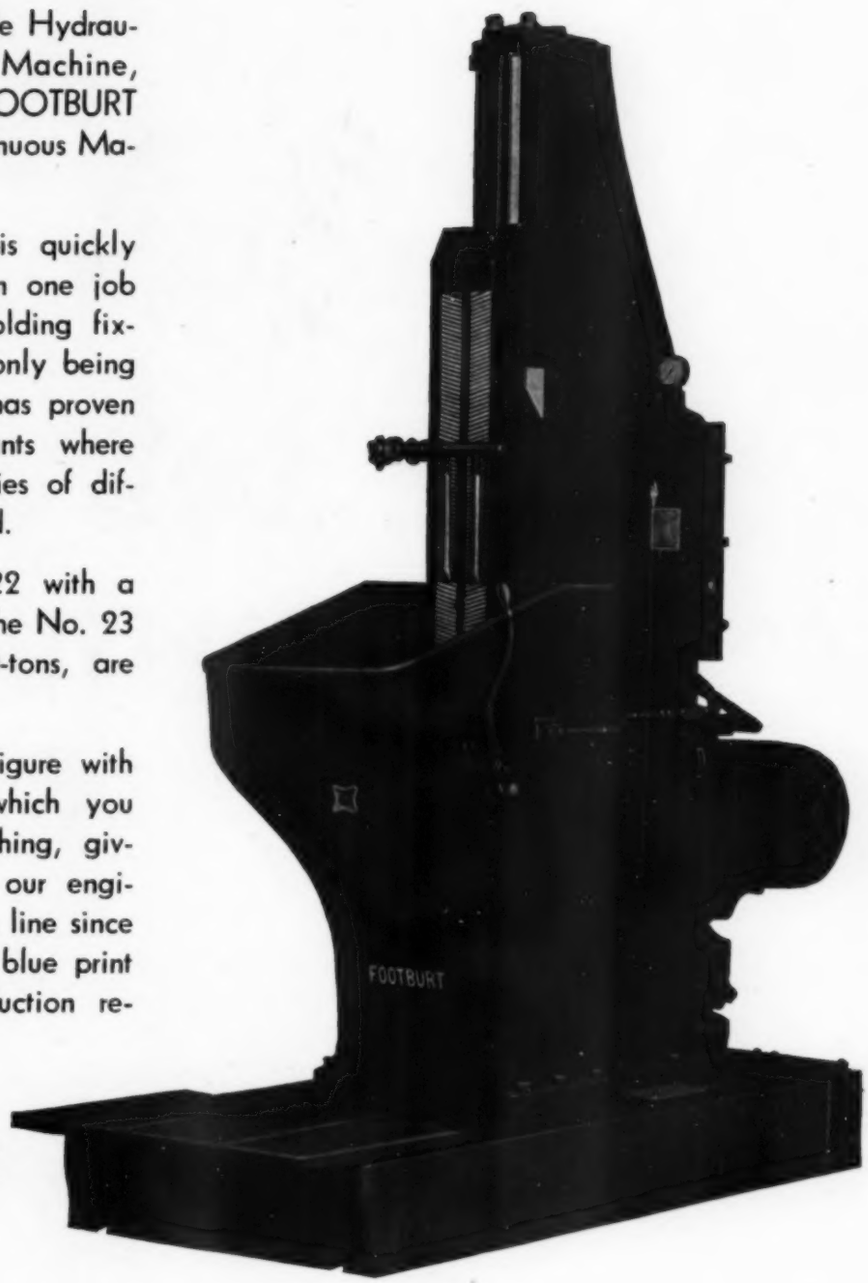
SURFACE BROACHING MACHINES

A Vertical Single Slide Hydraulic Surface Broaching Machine, built to complete the FOOTBURT line of Duplex and Continuous Machines.

Simple in design, it is quickly and easily changed from one job to another, the work holding fixture and broach holder only being replaced. This machine has proven very economical in plants where there are limited quantities of different parts to be machined.

Two sizes, the No. 22 with a capacity of 5-tons, and the No. 23 with a capacity of 10-tons, are made.

We will be glad to figure with you on any problem which you have in surfacing broaching, giving you the benefit of our engineering experience in this line since 1926. Just send us the blue print of your part with production requirements.



See these machines in Booth No. 912 at The Machine Tool Show.

THE FOOTE-BURT COMPANY • CLEVELAND, OHIO

Detroit Office: 4-151 General Motors Building **Chicago Office: 565 Washington Boulevard**

the tougher the job...

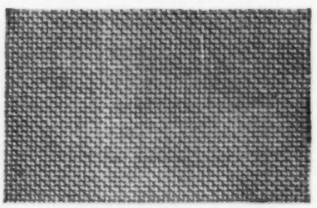
the more need for SILCROME

In scores of industries and hundreds of operations, production executives are speeding output and cutting costs with Silcrome wire and wire products.

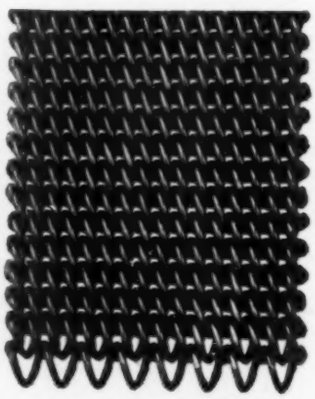
Typical is the paper mill. Here 24-hour operation, plus the corrosion of chemicals, heat and moisture put a premium upon avoiding shutdowns and costly replacements. Thanks to Silcrome, filters such as illustrated last longer and cost less per unit of output.

Tough jobs call for Silcrome Stainless Steel Wire and Cloth. Its use saves money and improves the competitive position of every processor who installs it.

Information regarding Silcrome Wire and the names of leading concerns who supply it in various forms will be supplied on request. Address, Research Dept., Ludlum Steel Company, Watervliet, N. Y.



Silcrome Double Crimped Wire Cloth is used in many industries



Section of Silcrome Wire Belt for High Temperature Work

LUDLUM

LUDLUM STEEL CO. • WATERVLIET, N. Y.

TOOL STEEL • SILCROME • NITRALLOY

American Machinist

SEPTEMBER 11, 1935

THE UNQUENCHABLE SPARK

ALTHOUGH the New Deal has been singularly successful so far in squelching every feeble attempt at recovery staged by business and industry, it has been totally unable to stifle the inventive genius of the machinery industry. That unquenchable spark which has smouldered steadily during the depression bursts into flame this week at the Machine Tool Show in Cleveland. There the metal-working industry is gathering to see what the master designers of the master tools of industry have done in recent months to make American machine tools the choice of wise buyers the world over.

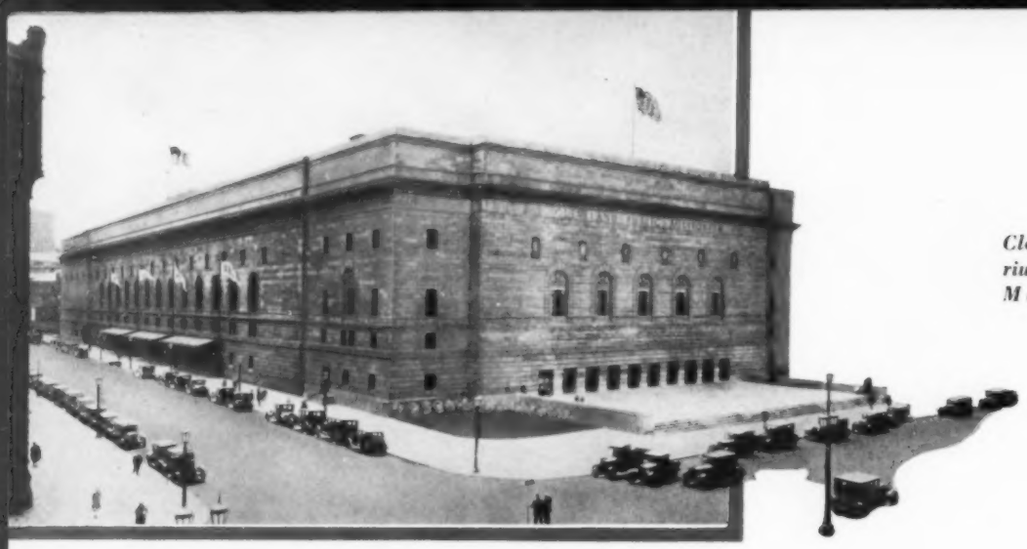
Ever since there has been a machine tool industry those in it have struggled constantly to make it easier and yet easier for man to cut and form metal to his needs. Theirs has been an unremitting fight to attain closer limits until today production machines of such accuracy are being built that they must be operated in a constant temperature room. The handling of work pieces between operations has always been a nightmare to many a superintendent. Now he can buy machines that do many operations with but one handling of the work, a boon both to the backs of the operators and to the profits of the shop.

Everyone is aware of the accumulated obsolescence in our metal-working plants, aggravated by six years of depression. If anyone had a lingering doubt it was dispelled when *American Machinist* published its 1935 Inventory showing two machine tools out of three over ten years old.

Funds are now available through banks and credit corporations backed by government insurance, and directly from the RFC and the Federal Reserve, to finance the purchase of replacement machines where they are economically justified. The new machine tools are on display at Cleveland. Most of them are described in this number of *American Machinist*—in fact, all that were completed in time for descriptions to be printed.

Study the new developments described in the editorial and advertising pages of this number. Decide what you need for your own shop. Go to Cleveland and see it if you can, but if you can't, place your orders anyway. Many builders are months behind on orders now, and they will be further behind by the time the Show is over.

The unquenchable spark of mechanical genius has been kept alive for you by the machine tool builders. It is burning more brightly than ever right now. See that it does not dim.



Cleveland Public Auditorium—Scene of the 1935 Machine Tool Show

An Exhibit—An Opportunity

BARNUM and Bailey once claimed for their three-ring aggregation of acrobats and animals the title "The Greatest Show on Earth." If these gentlemen were alive today and took the opportunity to visit the Machine Tool Show at Cleveland, they would surely be the first to admit that their claim for supremacy had been topped.

A combination of events has brought to Cleveland's Public Auditorium, this week and next, what is without question the most notable mechanical display ever held in this country. New machines, parts, accessories, and materials reflect a degree of development entirely in accord with American traditions of resourcefulness and invention.

The period of subnormal business we have just passed through had the effect of stimulating rather than dampening the efforts of manufacturers to improve their products. The last Machine Tool Show was held in 1929, which makes the present exhibit a culmination of six years of tireless, intensive development.

Altogether there are 229 exhibitors; of these 111 are members of the National Machine Tool Builders' Association with booths in the new North Annex. There are, in addition, 107 displays of machinery, other than machine tools, accessories and related machine shop products housed in the North Exhibit Hall and in the Arena Section. Booths of eleven business publications take the remaining space.

The present exhibit is the third sponsored by the National Machine Tool Builders Association. In 1927 the initial show had 180 exhibitors; in 1929 there were 244 with a number of companies unable to secure space because of the inadequate facilities then available. The current displays occupy 235,000 sq.ft. of floor space, 50 per cent more than were used six years ago.

Visitors to the Public Auditorium will at once be struck by the vast improvement in appearance in the products on display there. "Streamlining," a much overworked word, certainly does not properly apply to machines which do their work in one spot, but the 1935 machine tools strikingly reflect the influence of the sleek lines so prominent in the products of the automotive industry. This gain is not in beauty alone as smooth contours and inclosed construction have safety and functional attributes of real service to the user.

Beneath the attractive outlines visitors will be impressed by the ruggedness of these machines and the marked increase in cutting speeds now available. These have been provided to meet the high performance potentialities of the newer cutting materials, such as cemented carbides, Stellite and the improved high-speed steels. In 1929 tungsten carbide was little more than an experiment; few machines then had the capacity to use it to its fullest.

Speed increases have been accompanied by a step-up in power and a general improvement in rigidity. But increased output of the new designs are not attributable alone to higher revolutions or linear feet per minute. In many instances this objective is attained by multiple tooling and by devices designed to reduce handling time.

To a marked degree, the machine tools of 1935 reflect the demands of the automotive industry which they have served so ably. They show a trend toward specialization, toward sequential operations

in one set-up and toward multiple cuts taken simultaneously. This specialization avoids the inflexibility of the first "single-purpose" machines. In many designs unit construction or provision for adjustment make it possible to accommodate high production machines to change in product design at little or no cost.

Lessons learned in the more specialized tools have been applied to good advantage to the more standard units. These, too, have been given wider feed and speed ranges and are arranged for greater ease in manipulation.

All classes of machines show improvement in precision. Tools able to turn out work to limits of ten thousandths of an inch on a production basis are no longer a rarity; many have built-in devices for measuring the work in process.

Mechanically minded observers will naturally be curious to find out how these many advances in speed and precision have been obtained. Machine tool designers have been quick to adopt new materials and parts to their products. Alloy steels, properly heat-treated, are employed to strengthen shafts and gears. Normal physical characteristics of cast iron are augmented by the use of nickel and other alloying elements. Liberal use of ball and roller bearings permits higher speeds, simplifies construction, makes bearing adjustment possible and prolongs the accuracy originally built into the machine.

Another aid in maintaining precision is the improved means used to provide lubrication to gears, ways and bearings. On the majority of units, continuous and sight feed makes oiling automatic and foolproof. Cam-operated oil supply systems are popular, as well as pumps driven independently or by the machines themselves. Formerly such arrangements were confined to the main driving units, but now auxiliary and secondary mechanisms share in the benefits of continuous lubrication.

What has been said of oiling also applies largely to coolant supply. Higher cutting speeds give added importance to a generous flow of cutting compound. Machines designed for work on materials requiring pump and piping usually have ample capacity to flood the work under cut.

Probably the most outstanding operating change since the last Machine Tool Show is the greatly improved control means now provided. Whether the designer has employed a mechanical, electrical or hydraulic medium for this purpose, he has striven to put the tool completely under the operator's direct command. These designs reduce lost time between cuts, decrease setting-up operations and lessen the worker's fatigue. Speed, feed and rapid traverse can usually be controlled from a central operating position.

Control devices are no longer hung on the machine as unsightly appendages; they are designed with the main frame as a harmonious unit. Flange mounted, horizontal or vertical, motors together with well conceived control apparatus aid in producing smooth designs.

Since the 1929 Show, advances in broaching, in gear punching, in grinding and in precision boring have been especially noteworthy. Broaching, for years confined to irregularly shaped holes and splines, has become an external operation. Large castings are forced past a series of broaching cutters, which in many cases finish all plane and curved surfaces that can be machined in a given direction.

If any general comparison can be drawn between the current show and that held six years ago, it might be observed that while in 1929 emphasis hinged largely on increased speed, the 1935 machines reflect improvement in the quality of work produced. More efficient manufacturing performance has not been neglected—in fact, the machines on display give evidence of great ingenuity in this direction. But these time-saving facilities are not made at the cost of quality. Some processes call for extra operations to give a high degree of finish and close adherence to tolerances.

To the production executive in the metal-working industry *American Machinist* recommends a visit to the Show. It concentrates in one building tangible evidence of the progress of man's mastery over metal.

Whether the visitor is contemplating modernization of his own manufacturing facilities or not, he will take away with him a host of ideas that will prove invaluable. He will have seen the best performance of the Master Tools of Industry on a wide variety of metal parts. Surely no progressive manufacturer can afford to miss the opportunity now offered at Cleveland.

If your time at the Show is to be short, and you want to compare different makes of particular types of machines, use this cross index to select the booths where you want to concentrate. At the head of each group of builders is a silhouette of the machine divided according to American Machinist's 1935 Inventory. The red section represents the proportion of machines in use that are more than ten years old.

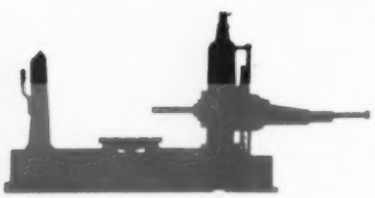
INDEX

by Machine Types

BENDING

65 Per Cent Over 10 Years Old

Buffalo Forge Co. 111
Whitney Metal Tool Co. 16



BORING

59 Per Cent Over 10 Years Old

Baker Bros., Inc. 307b
W. F. & John Barnes Co. 304a
Bullard Co. 205
Cimatool Co. 108b
Ex-Cell-O Aircraft & Tool Corp. ... 812
Foote-Burt Co. 912
Giddings & Lewis Machine Tool Co. 110
Heald Machine Co. 206
Ingersoll Milling Machine Co. 810
King Machine Tool Co. 910
Lucas Machine Tool Co. 202
Wm. Sellers & Co. 401
Universal Boring Machine Co. 304

BROACHING

66 Per Cent Over 10 Years Old

American Broach & Machine Co. . 1005

CUTTING-OFF

67 Per Cent Over 10 Years Old

Bridgeport Safety Emery Wheel Co. . 25
DeWalt Products Corp. A403
Peerless Machine Co. 4
Racine Tool & Machine Co. 106

DRILLING

64 Per Cent Over 10 Years Old

Baker Bros., Inc. 307b
Cincinnati Milling Machine Co. ... 207
Foote-Burt Co. 912
LaPointe Machine Tool Co. ..... D
Oilgear Co. 5
Charles G. Allen Co. 15
American Tool Works Co. 901
Avey Drilling Machine Co. 18
Baker Bros., Inc. 307b
Barnes Drill Co. 201
W. F. & John Barnes Co. 304a
Buffalo Forge Co. 111
Buhr Machine Tool Co. 308
Carlton Machine Tool Co. 904
Cincinnati Bickford Tool Co. 406
Cleereman Machine Tool Co. 4a
Dreses Machine Tool Co. 26
Ex-Cell-O Aircraft and Tool Corp. .. 812
Foote-Burt Co. 912
Fosdick Machine Tool Co. 1004
Green Bay Barker Machine & Tool Works 4a
Greenlee Bros. & Co. 902
Hoefer Mfg. Co. 12
Kingsbury Machine Tool Corp. 1009
Leland-Gifford Co. 403
Taylor & Fenn Co. 604

FORGING

74 Per Cent Over 10 Years Old

Acme Mach'y Co. 311
Ajax Mfg. Co. ..... F
Erie Foundry Co. 22
National Mach'y Co. A23

GEAR CUTTING

63 Per Cent Over 10 Years Old

Barber-Colman Co. 903
Brown & Sharpe Mfg. Co. 27
Cleveland Hobbing Machine Co. 301
Farrel-Birmingham Co. 105a
Fellows Gear Shaper Co. 305
Gleason Works 811
Gould & Eberhardt ..... E

HONING

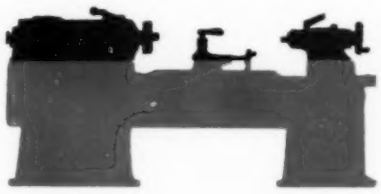
42 Per Cent Over 10 Years Old

Barnes Drill Co. 201
Hutto Engineering Co. 22a

GRINDING

60 Per Cent
Over 10 Years Old

Abrasive Machine Tool Co.	405
Arter Grinding Machine Co.	108
Baker Bros., Inc.	307b
Charles H. Besly & Co.	1
Blanchard Machine Co.	309
Bridgeport Safety Emery Wheel Co.	25
Brown & Sharpe Mfg. Co.	27
Bryant Chucking Grinder Co.	203
Cincinnati Grinders, Inc.	207
Diamond Machine Co.	605
Ex-Cell-O Aircraft & Tool Corp.	812
Gallmeyer & Livingston Co.	307
Gisholt Machine Co.	112
Gleason Works	811
Geo. Gorton Machine Co.	Arcade H
Heald Machine Co.	206
Kearney & Trecker Corp.	400
Landis Tool Co.	J-K
R. H. LeBlond Machine Tool Co.	1001
Mattison Machine Works	302
Norton Co.	101
Oliver Instrument Co.	208
Porter-Cable Machine Co.	307c
Pratt & Whitney Co.	906
Thos. Prosser & Son	E105
Rivett Lathe & Grinder Inc.	1010
Wm. Sellers & Co.	401
Sundstrand Machine Tool Co.	306
Taylor & Fenn Co.	604
Thompson Grinder Co.	24
Van Norman Machine Tool Co.	913
O. S. Walker Co.	3



LATHES AND TURNING

65 Per Cent
Over 10 Years Old

Acme Machine Tool Co.	109a
American Tool Works Co.	901
W. F. & John Barnes Co.	304a
Brown & Sharpe Mfg. Co.	27
Bullard Co.	205
Cincinnati Lathe & Tool Co.	11
Cleveland Automatic Machine Co.	20
Cone Automatic Machine Co.	A-B
Davenport Machine Tool Co.	1006
Foster Machine Co.	200
Gisholt Machine Co.	112
Goss & DeLeeuw Machine Co.	1008
Greenlee Bros. & Co.	902
Hendey Machine Co.	402
Jones & Lamson Machine Co.	607
R. K. LeBlond Machine Tool Co.	1001
Lehmann Machine Co.	312
Lodge & Shipley Machine Tool Co.	1018
Monarch Machine Tool Co.	813
National Acme Co.	601
New Britain-Gridley Machine Co.	909
Porter-Cable Machine Co.	C307
Potter & Johnston Machine Co.	602
Pratt & Whitney Co.	906
Reed-Prentice Corp.	C
Rivett Lathe & Grinder Inc.	1010
Seneca Falls Machine Co.	914
Sidney Machine Tool Co.	1011
Springfield Machine Tool Co.	800
Sundstrand Machine Tool Co.	306
Warner & Swasey Co.	905

MILLING

62 Per Cent
Over 10 Years Old

Brown & Sharpe Mfg. Co.	27
Cincinnati Milling Machine Co.	207
DeVlieg Milling Machine Co.	8
Geo. Gorton Machine Co.	Arcade H
G. A. Gray Co.	1012
Hall Planetary Co.	14
Hanson-Whitney Machine Co.	404
Ingersoll Milling Machine Co.	810
Kearney & Trecker Corp.	400
Kent-Owens Machine Co.	105
W. B. Knight Machinery Co.	19
Producto Machine Co.	307a
Reed-Prentice Corp.	C
Rivett Lathe & Grinder Inc.	1010
Sundstrand Machine Tool Co.	306
Taylor & Fenn Co.	604
Van Norman Machine Tool Co.	913

PLANERS

86 Per Cent
Over 10 Years Old

G. A. Gray Co.	1012
Rockford Machine Tool Co.	310

POLISHING AND BUFFING

57 Per Cent
Over 10 Years Old

Bridgeport Safety Emery Wheel Co.	25
United States Electrical Tool Co.	102

PRESSES

64 Per Cent
Over 10 Years Old

Buffalo Forge Co.	111
Greenerd Arbor Press Co.	E506
Hannifin Mfg. Co.	104
Henry & Wright Mfg. Co.	E308
Hydraulic Press Mfg. Co.	1014
Logansport Machine Co.	313
Oilgear Co.	5
V. & O. Press Co.	E315
Whitney Metal Tool Co.	16

SHAPERS

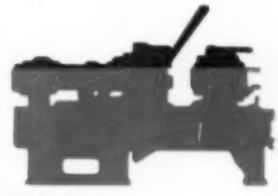
73 Per Cent
Over 10 Years Old

American Tool Works Co.	901
Cincinnati Shaper Co.	603
Gould & Eberhardt	E
Hendey Machine Co.	402
Ohio Machine Tool Co.	13
Pratt & Whitney Co.	906
Rockford Machine Tool Co.	310

SHEARS

70 Per Cent
Over 10 Years Old

Buffalo Forge Co.	111
Cincinnati Shaper Co.	603
Whitney Metal Tool Co.	16



THREADING

68 Per Cent
Over 10 Years Old

Acme Machinery Co.	311
Eastern Machine Screw Corp.	900
Geometric Tool Co.	103
Hall Planetary Co.	14
Hanson-Whitney Machine Co.	404
Landis Machine Co.	204
Murchey Machine & Tool Co.	209
National Machinery Co.	A23
Oster Mfg. Co.	7

WELDING AND CUTTING

36 Per Cent
Over 10 Years Old

Air Reduction Sales Co.	A412
Harnischfeger Corp.	504
Hobart Bros.	E103
Lincoln Electric Co.	E310

Directory of Exhibitors

·· 1935 ··

Machine Tool Show

. . . giving company names, booth numbers, products, hotel headquarters and representatives

A

Abrasive Machine Tool Co. 405. Hand feed surface grinder, automatic feed surface grinder, vertical spindle surface grinder, face grinder, motorized dust exhaust attachment, accessories for grinders.

HOTEL CLEVELAND—N. D. MacLeod, C. G. MacLeod, K. B. MacLeod, W. Sceeles, E. Cornell, C. Bell, E. Barton.

Acme Machine Products Co. Inc. A-312. Capscrews and nuts.

The Acme Machinery Co. 311. All-steel heading, upsetting and forging machine, threading machine, 6-spindle semi-automatic nut tapping machine, single threading machine, sample forgings and threadings produced on acme machines.

LOCAL OFFICE, 4533 ST. CLAIR AVE.—H. N. Anderson, K. F. Bruch, A. C. Knauer, C. E. Smith, M. Lamprecht, F. O. Anderson, F. J. Schroeder, D. R. Davies.

The Acme Machine Tool Co. 109-a. Acme universal turret lathes, with special high speed headstock and automatic turret.

F. Winkelman, *sales engineer*, L. Leon, *sales engineer*, H. Volz, C. Meier.

Ahlberg Bearing Co. E-301. Anti-friction bearing pillow blocks.

HOTEL HOLLENDEN—C. J. Bender, *pres.*, F. O. Burkholder, *vice-pres.*, B. S. Okner, *chief engineer*, C. Nelson, Jr., *asst. chief engineer*, P. P. Bender, R. D. Jones, R. M. Place, H. S. Mann, H. C. Petzing, J. E. Lewis, M. G. McGregor, P. H. Staerk, M. H. Palmer.

Air Reduction Sales Co. A-412-414. Oxygraph suitable in fabricating machine parts, Omnigraph, a semi-automatic machine for cutting metal, Tractograph, a portable, motor-propelled, hand-guided oxyacetylene cutting machine, Radiagraph, pipe cutting and beveling machine, Airco tensile and bend testing machine, Airco-graze outfit with Wal-Seal Fittings, Airco-DB hand welding and cutting apparatus including multi-stage regulators, National Carbide lights and lanterns, Airco oxygen and acetylene cylinders and supplies.

HOTEL CLEVELAND—C. D'W. Gibson, *asst. vice-pres. and general sales mgr.*, W. H. Ludington, J. F. Pryor, E. F. Pettigrew, H. W. Reade, G. Van Alstyne, J. F. Callahan, H. L. Rogers, F. E. Rogers, R. F. Helmkamp, H. F. Henriques, J. M. Driscoll.

The Ajax Manufacturing Co. F. Ajax air clutch forging machine, Ajax-Hogue wire drawer.

J. R. Blakeslee, *pres.*, H. D. Heman, *vice-pres.*, W. W. Criley, *general mgr.*, A. L. Guilford, G. G. Fristoe, J. R. Blakeslee, Jr., H. A. Zwierlein.

Charles G. Allen Co. 15. Drilling and tapping machines.

HOTEL CLEVELAND—Charles G. Allen, *gen. mgr.*, Charles G. Allen, Jr., C. M. Allen, G. F. McQuestion, J. Weeks.

The Louis Allis Co. E-411. Special type motors for machine tool applications.

HOTEL HOLLENDEN—C. F. Norton, R. J. Owen, W. F. Glaser, L. F. Keely and V. B. Hooper.

Allis-Chalmers Mfg. Co. E-401. Electric motors and accessories.

American Broach & Machine Co. 1005. Small vertical surface broaching machine, full automatic broaching machine.

HOTEL OLMSTED—F. J. Lapointe, *pres. and general mgr.*, D. A. DeLong, *sec.*, J. W. Podesta, *sales engineer*, J. E. Livingstone, W. Pfeil, C. L. Bunner, A. Vetter, E. Braatz.

American Chain Co. Wright Manufacturing Div. A-305. Hand and electric chain hoists and trolleys.

R. C. Blair, *sales mgr.*, S. J. Woodworth, C. W. Heim, W. J. Ryan.

American Tool Works Co. 901. "American" lathes, radial drills and shapers.

HOTEL CLEVELAND—J. B. Doan, *pres.*, R. S. Alter, *vice-pres. and foreign mgr.*, A. E. Robinson, *works mgr.*, L. W. S. Alter, *asst. to the pres.*, J. C. Hussey, *gen. sales mgr.*, H. W. Schatz, *eastern sales mgr.*, D. M. Barlett, C. H. Cormany, E. J. Gale, J. J. Shanahan.

Armstrong Bros. Tool Co. A-304. Armstrong tool holders, high speed bits, Armide cutters, lathe dogs, C-clamps, drop forged wrenches, detachable socket wrenches, star drills, machine shop specialties, pipe tools, solid and adjustable stocks and dies, receding pipe threaders, pipe cutters, vises, wrenches, reamers, chain tongs.

H. Armstrong, W. Armstrong, A. F. Arbogast, W. S. Kerr, W. Welter.

Arter Grinding Machine Co. 108. Arter automatic ring grinder, rotary surface grinder.

HOTEL AUDITORIUM—A. B. O'Donnell, *sales mgr.*, W. F. Fraser, *works mgr.*, H. Arter, *vice-pres.*, A. B. Lyman, *demonstrator*.

Avey Drilling Machine Co. 18. Three spindle Motor-Avey drilling and tapping machines, hydrolectric deep hole drilling machines, intensive speed drilling machine, Motor-Avey machine with Avey-draulic feed, three-spindle, belted, spindle drilling machines.

HOTEL CARTER—L. B. Patterson, *pres.*, J. G. Hey, *vice-pres, and general mgr.*, D. A. Patterson, *sec.*, G. K. McKee, *asst. general mgr.*, J. F. Mirrielees, *supt.*

B

Baker Bros. Inc. 307-b. Baker Craftsmaster, drilling and boring machine, cam feed drilling and boring unit, hydraulic feed drilling and boring unit.

HOTEL HOLLENDEN—W. Baker, A. L. Baker, G. E. Hallenbeck, H. L. Tigges, M. E. Fischer, J. Brigham, W. W. Elliott, G. Temple, C. Jobst.

Baker-Raulang Co. E-212. Crane trucks.

Barber-Colman Co. 903. Hobs, cutters, No. 3 hob sharpening machine, No. 3 hobbing machine, Type A hobbing machine, Type B hobbing machine, precision universal tool heads.

HOTEL AUDITORIUM—W. W. Dickover, H. K. Sorenson, M. N. Hough, C. S. Morey, E. F. Linderoth, T. R. Hodges, F. R. Ridgley, W. Brewster, F. B. Squires, M. C. Conwell, R. A. Horner.

W. F. and John Barnes Co. 304-a. Hydraulic square-ram drill units, hydraulic feed units.

HOTEL CLEVELAND—W. W. Barton, *general mgr.*, R. Billingham, *sales mgr.*, O. Ewert, *master mechanic*, P. R. Guirl, *sales engineer*, G. C. Johnson, *chief engineer*, K. L. Finkenstaedt, *production mgr.*, E. J. Svenson, *chief hydraulic engineer*, A. Riddiford, *asst. hydraulic engineer*, H. G. Anderson, *advertising mgr.*, O. Ingwalson, *supt.*, H. Karlberg, C. Billingham, C. Zuck.

Barnes Drill Co. 201. Horizontal honer, self oiling all-gear drilling and tapping machine, heavy-duty twin cylinder hydraulically reciprocated honing machine, single cylinder hydraulically reciprocated honing machine, Hydram drilling, boring and reaming machines, newly designed model drilling machine, mechanical honer.

HOTEL CLEVELAND—J. E. Andress, *pres.*, A. M. Johnson, *viec-pres. and chief engineer*, A. G. Block, *sec.*, W. M. Fiarbairn, *supt.*, R. M. Andress, *pur. agent*, R. F. Walker, *sales mgr.*, H. J. Caldwell, *asst. chief engineer*, F. Franzen, *asst. supt.*, C. H. Eden, A. F. Pierce.

The Leon J. Barrett Co. A-408. Oil extractor with Barrett safety feature and directly driven by built-in motors, Flywhirl enameler, a Grafton type machine size "O" arranged as a dryer and shown with a heater grid.

HOTEL CLEVELAND—L. J. Barrett, C. F. Moss, H. H. Wright, H. T. McGee.

Barret-Cravens Co. E-501. Lift trucks, skids, elevators, barrel and storage racks. Steel-leg platforms.

John Bath & Co. Inc. A-101. High speed steel ground thread taps, thread gages, internal micrometers, roll threading dies.

HOTEL CLEVELAND.

The Bausch & Lomb Optical Co. A-309. Toolmakers' microscope, contour projector, modified contour projector, D.K.T. wide field microscope, shop microscope, optical drill gage, optical bevel protractor, optical comparator, optical glass thickness gage, optical flats, metallurgical microscope, photomicrographic camera, new contour projector.

HOTEL HOLLENDEN—I. L. Nixon, C. Bausch. H. Kurtz, C. C. Nitchie, H. Shippy, E. Koch.

Charles H. Besley & Co. 1. Flat surface grinding machines, abrasive disks.

Black & Decker Mfg. Co. E-101. Complete line of industrial tools including: drills, grinders, sanders, screw drivers. High cycle portable tools.

G. M. Buchanan, G. Treslar, T. H. Belling, J. Schreiner, R. D. Black.

G. S. Blakeslee & Co. E-202. Blakeslee Niagara and pump type alkali washing machines, Blacosolv degreasing machine.

HOTEL HOLLENDEN—A. S. Reichel, H. A. Sparrow, J. W. Dammers, G. W. Anderson, M. B. Pickett.

The Blanchard Machine Co. 309. Grinders, grinding wheels and segments, wheel mounter, high power demagnetizer.

HOTEL CLEVELAND—H. K. Spencer, R. L. Rickwood, H. F. Skillings, W. H. Cannon, L. S. Kinsman, C. J. Olsen.

The Bridgeport Safety Emery Wheel Co. 25. Heavy duty face and shear blade grinder, heavy duty high speed floor grinder, "Abrasaw" cut-off machine, two-speed buffing lathe, 20 in. sectional grinding wheel.

HOTEL HOLLENDEN—W. M. Hyde, F. C. Penny, H. T. Pratt, A. H. Kean.

The Bristol Co. A-303. Bristol socket head set and cap screws, Bristol belt fasteners and plates.

H. L. Griggs, *vice-pres. and general sales mgr.*, H. E. Beane, C. Worth, J. Harper.

Brown & Sharpe Mfg. Co. 27. Universal milling machine with universal attachment and crane attachment, slotting attachment and tools, short lead and feed reducing attachment, Omniversal milling machine with universal milling attachment and crane, high speed universal milling machine, plain milling machine, standard vertical spindle milling machine, universal grinding machine, plain grinding machine, surface grinding machine, high speed automatic screw machine, high speed automatic screw threading machine, wire feed screw machine, milling cutters, hobs and small tools.

Bryant Chucking Grinder Co. 203. No. 16 and 24 Bryant Grinder, No. 4 and 5 Grinder with automatic sizing device.

HOTEL CLEVELAND—J. B. Johnson, M. H. Arms, L. C. Gilchrist, A. Stubbs, G. M. Green, R. O. Perry, W. M. Smith, A. G. Fairbanks, J. L. Hronek, C. N. Williams, G. V. Lynch.

The Buckeye Portable Tool Co. A-407. Complete line of Hercules portable, pneumatic and electric tools.

HOTEL CLEVELAND—C. M. Overley, H. O. Gummere, W. R. Gummere, H. R. Mitchell, A. G. Lauzon, C. W. Ritsch, G. H. Michael.

The Buffalo Forge Co. 111. Power punches and shears, billet shears, bar cutters, bending rolls, single and multiple spindle drills, sensitive drilling and tapping machines.

HOTEL CLEVELAND—E. G. Leonard, *sales mgr.*, G. H. Zimmer, *designing engineer*, A. T. Yates, *service and sales engineer*, E. A. Forsyth, *export mgr.*, G. J. Neher, *plant supt.*, T. H. Booth, *asst. supt.*, C. Happ, *tool and die designer*, J. E. Mossell, A. T. Lamb, R. L. Pope and W. A. Wagner, *sales representatives.*

Buhr Machine Tool Co. 308. High production 2-way driller, Buhr hydroscru power unit, single purpose power unit, index table, adjustable drill head with locking plate, fixed center drill head, one and two speed drill speeders, micro-adjustable spindles for Nos. 0, 1, 2, 3 M.T., Buhr drill and tap collets.

HOTEL AUDITORIUM—J. F. Buhr, G. D. Evans, R. G. Ellis, D. H. MacDonell, A. G. Nancarrow, D. T. Peden, C. P. Roth, H. C. Stovel.

The Bullard Co. 205. Type "D" and "J" Mult-Au-Matics. single-spindle vertical automatic lathe, high-speed vertical turret lathe, hydro-shift vertical turret lathe.

HOTEL CLEVELAND—E. P. Bullard, E. C. Bullard, D. B. Bullard, R. C. Bullard, J. W. Bray, E. P. Blanchard, J. R. Tillman, J. A. Bullard, A. H. Platt, F. A. Thompson, W. Thompson, C. Keller, F. S. Lincoln, F. Hatch, Jr., J. M. Welch, W. A. Conner, T. E. Dunn, V. Hart, L. Sterry.

The Bunting Brass & Bronze Co. A-208. Bronze bearings, bushings, castings, parts and bearing metals.

HOTEL HOLLENDEN—G. H. Adams, *gen. sales director*, G. N. Evans, *chief research engineer*, H. R. Holt and J. E. Owens, *sales dept. executives.*

C

Carboloy Company, Inc. E-207. Carboloy metal cutting tools, Carboloy diamond impregnated tools, for the finished and semi-finished dressing of grinding wheels.

HOTEL CLEVELAND—K. R. Beardslee, F. W. Cooper, A. H. Godfrey, S. H. Horn, E. C. Howell, J. R. Longwell, A. A. Merry, F. C. Ritner, W. G. Robbins, N. N. Shepherd.

The Carborundum Co. E-408. Grinding wheels and other abrasive products, portable sanding machines.

HOTEL CLEVELAND—S. F. Courter, F. J. Tone, H. W. Collinson, B. H. Work, W. T. McCargo, F. Risler, E. C. Christenson, F. C. Guest, E. F. Konker.

The Carlton Machine Tool Co. 904. Radial drills.

HOTEL HOLLENDEN—J. C. Carlton, H. J. Westmeyer, H. D. Keeling, F. X. Moran, J. C. Carlton

The Carpenter Steel Co. A-501. Dramatization of the new "Matched Set Method" of selecting the proper tool steel from making all kinds of tools, Carpenter torsion impact machine, stainless steels and their applications.

HOTEL STATLER—F. A. Bigelow, *pres.*, J. H. Parker, *vice-pres.*, F. R. Palmer, *asst. to the pres.*, B. H. DeLong, *metallurgist*, G. H. Edmonds, *exhibit mgr.*, C. A. Heil, J. S. Bailey, H. G. Roodhuyzen, V. W. Gardner.

Century Electric Co. A-405. Motors that are particularly adapted to machine tool operation, squirrel cage motors which are fan-cooled, explosion-proof, high torque.

E. S. Pillsbury, *pres.*, G. Smith, *vice-pres. and general mgr.*, R. J. Russell, *vice-pres. and sec.*, R. N. Hill, *works mgr.*, I. S. Adelberg, R. E. Blersch, G. E. Moe.

Chicago Belting Co. A-502. Hydraulic packing installations, short center drives, demonstration of savings of modern group drive, different types of mechanical leathers.

HOTEL CLEVELAND—E. H. Ball, *pres.*, A. J. Weis, *gen. sales mgr.*, W. Davies, *chief engineer*, G. Starr, *Pittsburgh mgr.*, H. C. Ellsworth, *Cleveland mgr.*, H. E. Dickerman, *New York Mgr.*, J. Craig, *Cleveland sales engineer*, J. R. Hopkins.

The Cimatool Co. 108-b. Heavy duty precision boring machine, Peerless Chamfering Machine, Bolender gear burnisher, Bolender grinding and boring chuck. Standard drill jigs, Sheffield thread lead tester, several visual gages, Sheffield electric gage, plug, snap, thread, spline, bar, adjustable plug and keyway gages.

HOTEL HOLLENDEN—O. M. Poock, *pres.*, L. F. Poock, *vice-pres. and general mgr.*, D. R. Laughter, *works mgr.*, C. H. Reynolds, *pres., Sheffield Gage Div.*, M. W. Davis, *general mgr. Sheffield Gage Div.*, O. W. Simmons, I. Snyder, *production engineer*, F. W. Markwick, *superintendent gage div.*, G. Laughter, *sales engineer.*

Cincinnati Bickford Tool Co. 406. High-speed all-geared, super service radial drills, 24-in. super service upright drills, one having box column and compound table, and other round column and adjustable round table.

HOTEL CLEVELAND—A. H. Tuechter, G. P. Gradolf, N. C. Schauer, O. E. Schauer, R. N. Piper, P. E. Heckel, C.LeRoy Reichert L. L. Schauer, L. D. Quackenbush.

The Cincinnati Lathe & Tool Co. 11. Engines, lathes and attachments.

HOTEL CLEVELAND—W. C. Heindel, A. C. Meier, R. Knies, C. C. Poling, R. L. Giebel, J. E. Bullock, G. L. Williston, E. C. Cummings, F. A. Brandes.

Cincinnati Milling Machine & Cincinnati Grinders, Inc. 207. Milling, grinding and broaching machines.

HOTEL CLEVELAND—F. V. Geier, *pres.*, P. O. Geier, *chairman of the board and treas.*, P. Cone, *asst. general mgr.*, F. M. Angevin, *sec.*, W. W. Tangeman, *vice-pres.*, M. Romaine, *manager of engineering servie department*, G. Binns, *sales engineering director*, S. Einstein, *chief engineer*, L. Nenninger, *asst. chief engineer*, H. Ernst, *research engineer*, E. D. Vancil, *head of engineering department.*

The Cincinnati Shaper Co. 603. Cincinnati rapid traverse shaper, all-steel shear.

HOTEL CLEVELAND—P. D. March, Jr., H. S. Robinson, R. T. Hazleton, G. Diehl, F. H. Pfefferle.

The Cleereman Machine Tool Co. 4-a. Drilling machines.

H. B. Cleereman, *pres.*

The Cleveland Automatic Machine Co. 20. Multiple spindle bar and chucking machines.

HOTEL CLEVELAND—H. T. Latto, H. C. Roushkolb, H. E. Nunn, Jr., H. Minniear.

The Cleveland Hobbing Machine Co. 301. Cleveland eight-spindle Ridgidhobber, single-spindle Ridgidhobber, spiral bevel Ridgidhobber.

HOTEL HOLLENDEN—C. W. Blossom, *pres.*, W. H. Staples, *vice-pres. and general mgr.*, F. H. Adams, *vice-pres.*, O. E. Staples, *chief engineer*, T. Carlin, *supt.*, F. Banfield, F. H. Beldin, B. R. Abernethy, H. M. Goebel, W. H. Pawlett, S. Roward, E. Strunk, W. Cassel, B. Reinke.

The Cleveland Twist Drill Co. E-306. Complete line of drills and reamers.

HOTEL CLEVELAND—W. E. Caldwell, H. T. Jensen, H. A. Bockram, A. J. Ireland, H. Tuckhaber, G. A. Burkhardt, D. R. Webb, E. T. Snider, E. T. Horan, J. H. Phillips, J. T. Maxwell, F. A. Kelly, T. Thomas, H. E. Bergquist.

The Cleveland Worm & Gear Co. E-105. Standard worms, gears and speed reducers, machine for measuring the lead of a worm.

HOTEL HOLLENDEN—H. Dingle, *pres.*, R. E. Dittoe, *asst. sec.*, S. L. Eastman, W. W. Clark, W. R. Cavanaugh, R. H. Thorkelson, L. E. Trotter, W. M. Stilwell.

Clipper Belt Lacer Co. A-415. Belt lacer, belt hooks, belt cutters, connecting pins.

E. H. Forsyth, J. C. Bergers, C. P. Field.

Colt's Patent Fire Arms Mfg. Co. E-210. Colt Autosan washing and drying units.

HOTEL STATLER—G. R. Porter, *mgr. Autosan div.* G. Webb, *mechanical supt. Autosan div.*, C. R. Lewis, *engineer.*

Cone Automatic Machine Co. Inc. A-B. Auto screw machines, chucking machines.

The Cushman Chuck Co. E-410. Hand operated chucks, straight-line power units, "Push-Pull" power unit, an electric power operated chuck, the Cushmatic, power operated chuck wrenches.

HOTEL CLEVELAND—H. E. Sloan, *pres.*, J. J. Jordan, *2nd vice-pres.*, G. A. Highberg, *supt.*, H. W. Hultgran, *asst. sec.*

Cutler-Hammer, Inc. E-201. Standard and custom built motor controls for separate and built-in mountings, control accessories, electric brakes, magnetic clutches and safety switches.

G. S. Crane, *general sales mgr.*, B. M. Horter, *mgr. resale sales*, F. U. Webster, *mgr. merchandising sales*, L. P. Niessen, *advertising mgr.*, E. W. Seeger, *asst. chief engineer*, A. G. Pierce, M. C. Steffen.

D

Davenport Machine Tool Co., Inc. 1006-1007. Five spindle screw machines equipped with tool for finishing parts in one operation, machine for making lantern pinions for use in clocks.

HOTEL AUDITORIUM—E. W. Brinkman, A. G. Dresser, G. Bouvier, A. Dunlap, F. Corser, E. Spinney, E. Chatterson, C. Ayres.

Dayton Rogers Mfg. Co. A-207. Metal stampings in small lots, combination angle plate and holocator, adjustable spacing collar for milling machine cutter arbor, layout fluid.

HOTEL HOLLENDEN—W. S. Ryan, F. F. Milligan, F. C. Miller, W. J. Sansom, H. C. Skinner, R. V. Taylor, J. R. Fuller.

The Dayton Rubber Mfg. Co. A-504. Cog, V-flat and V-belt drives.

K. H. Glanton, *vice-pres.*, T. C. Davis, *mgr.*, M. O. Williams, T. O. Slingman, C. M. Adams, L. C. Strobeck, J. T. Wilson, H. A. Tulidge, R. L. Wetzel, J. D. Hersey.

DeVlieg Milling Machine Co. 8. Milling machines, milling units.

DeWalt Products Corporation. A-403. DeWalt metal cutters using abrasive wheels or saw blades.

P. Gardner, *pres.*, W. Ross Stevens, *general sales mgr.*, H. B. Fitzwilliam.

Diamond Machine Co. 605. Diamond face grinding machine, Type 6 surface grind-

ing machine and "Knee Action" surface grinding machine.

HOTEL CLEVELAND—H. S. Chafee, D. K. Bartlett, D. T. Huxford, B. E. Crostabile, E. H. Bradley, L. L. Lory, A. Woodward.

The Dresses Machine Tool Co. 20 Radial drills.

E

The Eastern Machine Screw Corporation. 900. H&G general purpose and insert chaser self-opening die head, solid adjustable dies using insert chasers, threading machines, chaser grinders.

HOTEL CLEVELAND—C. W. Bettcher, *sec.;* H. F. Wiler, O. Hoelzel, G. E. Nager, E. Culp, A. E. Chadwick, A. Jackson, D. Larson.

Elwell-Parker Electric Co. E-402. Displays demonstrating important machine parts, methods of heat-treating and precision grinding, load-transportation by the Elwell-Parker system of materials handling.

G. W. Brown, A. H. Dobler, J. F. B. Meikle, J. M. Hawkins, W. J. R. Alexander, C. L. Cole, F. E. Price, W. L. Kammerer, J. P. Lyons, L. F. Milner, E. H. Wood, S. M. Conant and G. E. Kent.

Erie Foundry Co. 22. Electric air board drop hammer.

The Euclid Elec. & Mfg. Co. A-202. Electric motor control apparatus.

Ex-Cell-O Aircraft & Tool Corp. 812. Precision boring machines, thread grinder, vertical drill press, hydraulic power units, cylinder boring machine, grinding and finishing machines, and a display of grinding spindles, cutting tools, drill jig bushings, precision aircraft parts.

HOTEL STATLER—N. A. Woodward, *pres.*, W. F. Wise, *sales mgr.*, P. Huber, *vice-pres. and asst. general mgr.* R. B. Criddle, T. Olsen, E. Ramsay, C. Brower, S. Langston.

F

The Fafnir Bearing Co. E-312. Self-aligning, grease shield, felt seal, special retainer, wide inner ring and other bearings, ball bearing power transmission units.

HOTEL HOLLENDEN—C. S. Stanley, R. R. Searles, E. J. Gilbert, W. L. Rager, T. H. Schrebrat, H. R. Reynolds, E. R. Carter, C. G. Rosensweig.

Fairbanks, Morse & Co. A-215. Totally inclosed fan cooled, ball bearing motors, poly-phase, single-phase, direct-current, splash-proof, motors, a pre-wound stator and shaftless rotor, squirrel-cage motors, motor-driven direct connected rotary pump, Printomatic weigher.

G. W. Snodgrass, L. T. Allis, R. L. Johnson, E. E. Lundquist, E. Chambers, E. J. Hay, G. J. Podlesak, R. F. Koops.

Farrel-Birmingham Co., Inc. 105-a. Sykes gear generator, gear tooth comparator, gear units, flexible couplings, products produced by Sykes gear generators.

HOTEL CLEVELAND—A. G. Kessler, *vice-pres.*, W. E. Sykes, *consulting engineer*, A. Kuhns, *executive engineer*, L. D. Chirgwin, *asst. gen. mgr.*, D. Watt, *operator*, J. Brandt, *sales engineer*, C. E. French.

The Farval Corporation. A-105. Dualine centralized systems of lubrication, measuring valves.

HOTEL HOLLENDEN—H. Dingle, *pres.*, A. J. Jennings, *general sales mgr.*, C. R. Burrell, *sales engineer*, W. W. Clark, W. R. Cavanaugh, R. H. Thorkelson, H. M. Beatty, L. E. Trotter, W. M. Stilwell, Jr., H. M. Leathers, H. H. Barrows, F. A. Hausman.

Federal Products Corporation. E-502. Dial indicators and precision measuring instruments.

10465 CARNEGIE AVE.—W. C. Straub, C. G. Gilbert, C. C. Street.

The Fellows Gear Shaper Co. 305. Gear shapers for roughing and finishing gears, Hourglass thread generator for cutting steering worms, Hourglass gear shapers for generating worms for reduction drives, lapping machines for both spur and helical gears, machines for sharpening helical gear cutters, gear measuring machines, Red Liners, special cutters.

HOTEL CLEVELAND—E. R. Fellows, *pres. and general mgr.*, E. J. Fullam, *sec. and treas.*, E. W. Miller, *chief engineer*, W. F. Slomer, *general sales and service mgr.*, E. Stubbs, *factory mgr.*, C. H. Winkler, *supt.*, R. M. Fellows, J. B. Strong, E. T. Beardsall, A. T. Sink, L. B. Alliason, C. C. Bankes, D. T. Hamilton, *advertising mgr.*

Firth-Sterling Steel Co. A-206. Firthite tools, Firthaloy dies which are made of tungsten and other carbides, high speed steel cutting tools.

HOTEL STATLER—D. G. Clark, *vice-pres.*, O. K. Parmiter, M. F. Judkins, D. M. Smith, A. B. Corbin, G. W. Frick, Jr., A. F. Lind, H. E. Lennor.

The Foote-Burt Co. 912. Vertical, single slide, hydraulic broaching machine, duplex broaching machine, cam-feed drilling unit, hydraulic feed drilling unit, lead screw tapping unit, Sipp type sensitive drilling machines.

HOTEL STATLER—T. H. Doan, R. E. Delamater, W. S. Austin, H. Kennedy, W. F. Stegner, W. J. Sproul.

Ford Motor Co., Johansson Division. A-201. Johansson gage blocks and accessories, including sine bars, foot blocks, adjustable holders, jaws, center and tram points, scribers, and straight edges.

HOTEL HOLLENDEN—O. E. Green, C. E. Johansson, W. H. Scheer, Roy Linn, Robert Linn, S. Langston, E. Aldeborgh, J. C. Heitman.

Fosdick Machine Tool Co. 1004. Radial, upright and sensitive drilling machines.

HOTEL HOLLENDEN—R. H. McClellan, C. M. Strait C. Honhorst, C. E. Linden.

Foster Machine Co. 200. Motor in the base No. 1 Foster machine, 2½-in. saddle type universal turret lathe, all-geared head Universal, Foster Fastermatic, motor in the base 1½-in. machine.

HOTEL CLEVELAND—H. A. Moore, *general sales mgr.*, W. H. Foster, *pres.*, L. D. Tyson, *chief engineer*, W. P. Tripp, C. Niblock.

The Fostoria Pressed Steel Corporation. A-411. Sorwal Coolant Filter, machine lamp, "TiteSeal Compound."

HOTEL STATLER—C. D. Pifer, *president*, C. W. McDaniel, *general sales mgr.*

Fulton Foundry & Machine Co. Inc. A-212. High test iron castings.

G

Gallmeyer & Livingston Co. 307. Surface grinding machines, tap grinders.

HOTEL CLEVELAND—S. O. Livingston, J. DeKoning, C. H. Gallmeyer, B. C. Saunders.

General Electric Co. E-206. Motors, control apparatus, switch gears, "Carboloy" cemented carbide tools.

HOTEL HOLLENDEN—C. A. Boers, C. L. Muzzy, R. P. Bullen, C. E. Anthony, J. P. Jones, S. D. Fendley, M. H. Russell, J. T. Stone, A. W. Trabert, W. M. Bowerstock, H. C. Besch, E. J. Rasmusson, F. T. Fitzgerald, J. E. N. Hume, J. J. Curtin, H. E. Murphy, R. S. Glenn, C. C. Runner, J. D. Wright, H. W. Rogers, F. H. Penney, J. W. Harper, G. R. Huether, A. W. Bartling, K. R. Van Tassel, D. F. Smalley.

The Geometric Tool Co. 103. Geometric threading machine, chaser grinder and combination die head using tangent and circular chasers, rotary and stationary die heads, taper die heads, caps, chaser grinding fixture.

HOTEL CLEVELAND—J. W. Sneyd, *vice-pres.*, G. A. Dennison, *sales mgr.*, F. O. Uihlein, *sales engineer*, T. A. Pritchard.

Giddings & Lewis Machine Tool Co. 110. No. 350-T table-type, high-power, precision, horizontal boring, drilling and milling machine, No. 350-FQ floor-type precision, horizontal boring, drilling and mill-

ing machinge having an adjustable quill.

HOTEL CLEVELAND—H. B. Kraut, C. Debuhr, K. F. Gallimore, R. M. Woytych, E. E. Wagner, D. M. Laflin, A. E. Ulrich.

Gisholt Machine Co. 112. Gisholt turret lathe, Universal tool grinder and dynamic and static balancer, boring bars, reamers.

CLEVELAND AND STATLER HOTELS—H. S. Johnson, *pres.*, G. H. Johnson, *vice-pres.*, C. H. Johnson, *vice-pres.*, W. J. Hannum, *sales mgr.*, F. M. Long, E. A. Coombs, F. L. Chapman, G. M. Class, G. E. Thomas, R. D. Heflin, R. H. Bruce, A. R. Engler, C. B. Carr, E. B. Verner, J. H. Nebel, C. J. Baxter, T. J. LaManna, U. S. James, A. S. Beckwith.

Gits Bros. Manufacturing Co. A-406. Oil cups, oil and grease seals, lubricating devices.

CARTER HOTEL—R. J. Gits, *pres.*, F. Zeman, *sales mgr.*

Gleason Works. 811. Straight bevel gear generators, completing generator, spiral bevel and hypoid generators, spiral bevel and hypoid gear grinder, spiral bevel and hypoid pinion rougher, gear testing machines, spiral cutter and generator tool sharpener.

HOTEL CLEVELAND—J. E. Gleason, E. B Gleason, W. H. Snow, A. L. Stewart, S. H. Earl, D. Vande Vate, B. E. Shlesinger, G. H. Bryan, H. G. Hartman, J. E. McHenry, L. C. Gleason.

Gogan Mahine Corporation. A-211. Hardness testing machines.

George Gorton Machine Co. Arcade H. No. 9-J super speed vertical milling machine, No. 8½-D die duplicator, No. 8-D super speed vertical milling machine, No. 3-D pantograph machine, No. 3-U pantograph machine, No. 3-K pantograph machine, No. 375-1 cutter grinder.

G. Gorton, Sr., *pres.*, G. Gorton, Jr., *vice-pres.*, P. M. Henkes, *chief engineer*, G. Horner, foreman engraving dept., R. T. Lunn, *sales engineer*, B. Rasmussen, *demonstrator.*

The Goss & DeLeeuw Machine Co. 1008. Auto chucking machines.

Gould & Eberhardt. E. Plain tool room universal shaper, industrial shaper, gear hobbing machine.

FENWAY HALL—F. L. Eberhard, *pres.*, H. E. Eberhardt, *sec.*, W. F. Zimmerman, *works mgr. and chief engineer*, G. E. Spies, *sales mgr.*, F. G. Eberhardt, A. Miller, J. J. Duffy and J. Craig, *sales engineers*, A. Ullrich, *factory supt.*

The G. A. Gray Co. 1012. Gray milling planer.

HOTEL CLEVELAND—A. Marx, *vice-pres. and general mgr.*, J. E. Doran, *sales mgr.*, F. E. Cardullo, *chief engineer*, J. Walter, *asst. chief engineer*, H. W. Hunt, *asst. supt.*

Greenerd Arbor Press Co. E-506. Bench type 12-ton Greenerd arbor press, armature press, motor-driven Greenerd arbor press.

HOTEL HOLLENDEN—Warren L. Martin, *gen. mgr.*

Greenlee Bros. & Co. 902. Four-spindle automatic screw machines, 5- and 25-hp. self-contained hydraulic units, way type multiple spindle drilling machines.

HOTEL CLEVELAND—G. C. Purdy, *pres.*, A. H. Eggers, *sales mgr.*, L. H. Geddes, *asst. sales mgr.*, J. H. Mansfield, *chief engineer*, J. M. Macrae, W. H. McCoy, C. F. Penrose, F. J. Follem, A. Miller.

H

The Hall Planetary Co. 14. Thread and form milling machines, cutter heads and cutters.

FENWAY HALL—P. Hall, H. C. Sheaffer, H. J. Leisner, J. E. Austerberry, C. R. Austerberry, L. K. Goss.

Hannifin Manufacturing Co. 104. Air operated plastic and rubber molding press, 35 ton hydraulic straightening press, air operated spring cover machine, hydraulic rivet press, two new types of portable riveting presses, air operated arbor presses, air operated chucks, vises and clamping devices, control valves, regulating valves, air cylinders, hydraulic cylinders.

HOTEL STATLER—V. W. Peterson, O. J. Maho, M. A. Heeren, H. H. Mercer, R. A. Bean, E. D. Thompson, C. Castiglia, W. R. Wyatt, J. J. Feeney.

The Hanson-Whitney Machine Co. 404. Universal semi-automatic thread milling machine, universal vertical tool and die shaping machine, rapid precision centering machine, ground thread lead screws, taps, thread gages and hobs, finished after hardening by the "Hanson process."
J. W. Johnson.

Harnischfeger Corporation. E-504. P&H-Hansen arc welders, electric hoists and motors.

W. Harnischfeger, C. W. Daniels, F. Daniels, F. Wollaeger, J. O. Ferch.

The Heald Machine Co. 206. Gap internal grinder, airplane cylinder grinder, centerless size-matic, centerless gage-matic, Bore-matic precision boring machine, Bore-matic small double-end precision boring machine, Bore-matic single-end precision boring machine.

R. N. Heald, *pres.*, S. T. Massey, *vice-pres.*, R. A. Heald, *treas.*, R. S. Heald, *sec.*, F. H. Grimshaw, *experimental engineer.*

The Hendey Machine Co. 402. A line of lathes from 12 to 20 in., high speed lathes, shapers.

HOTEL CLEVELAND—D. Ayr, *pres.*, F. J. McCarty, J. W. Markham, F. H. Seng, J. H. Welch, W. F. Henly, G. H. Hazley, F. C. Parman, E. Barker, K. F. Kelly, P. W. Rice, H. H. Palmer, C. Bouillon, G. H. Knight, K. Berger, S. French, H. Blakeslee, H. Platt, L. Ruot, W. Walker, W. Scoville.

The Henry & Wright Manufacturing Co. E-308. 50-ton dieing machine, automatic feed high-speed steel press, automatically controlled motor driven stock reels.

HOTEL CLEVELAND—F. K. Simmons, *pres.*, A. E. Caserta, *chief engineer*, E. W. Slocum, C. H. Hamilton.

Hobart Brothers Co. E-103. Five electric arc welders; 75, 150, 210, 300 and 400 ampere sizes.

HOTEL ALLERTON—E .A. Hobart, *pres.*, W. H. Hobart, *vice-pres.*, O. H. Menke, *supt.*, E. K. Butterfield, *welder sales*, W. J. Chaffee, *welder sales*, E. C. Galbreath, *sales mgr.*, R. L. Flora, *engineer*, R. C. Bercaw, *welder demonstrator*, B. A. Lutz, *purchasing agent*, H. P. Gordon, L. Gordon, H. L. Wehrheim.

Hoefer Mfg. Co. Inc. 12. Drilling machine units, drilling machine heads.

HOTEL AUDITORIUM—C. A. Hoefer, *sec.*, Paul Andree, *gen. mgr.*, A. G. Ericson, *chief eng.*

E. F. Houghton & Co. E-204. Vim Tread belting, extreme pressure straight cutting oils, industrial lubricants, leather packagings, heat-treated parts, using Houghton's Perliton liquid carburizer.

HOTEL CLEVELAND—C. W. Pressell, *vice-pres. and director of sales*, E. F. Rogers, *general sales mgr.*, C. G. Schultze, *sales mgr. central division*, W. A. Bushner, *sales mgr. eastern division*, H. E. Sansome, Jr., *asst. sales mgr. eastern division*, S. T. Doland, R. J. McCormick, D. J. Richards, A. A. Miller, W. A. Fletcher, H. E. Martin, H. L. Dunn, H. D. Lloyd, E. C. Barlow, D. C. Miner.

Hyatt Roller Bearing Co. A-409. Standard series bearings employing helical rollers, Hy-Load type of Hyatt bearings with solid rollers.

HOTEL HOLLENDEN—H. K. Porter, *sales mgr.*, O. W. Young, *chief engineer*, C. L. Newby, J. M. Kelly and W. L. Illiff, *divisional mgrs.*, H. M. Carroll, *advertising mgr.*, L. F. Stuebe, L. L. Hill and F. U. Naughton, *sales engineers.*

The Hydraulic Press Mfg. Co. 1014. Hydro-Power fastraverse presses, pumps, controls.

HOTEL WEST LAKE—F. B. McMillin, *pres.*, H. F. McMillin, *vice-pres.*, P. C. Pocock, W. Ernst, W. H. Herr, R. Thoreson, D. C. Youngblood, H. J. Miller, W. R. Tucker, A. W. Payne, C. C. Eichler, H. S. Booher.

Hutto Engineering Co. Inc. 22-a. Honing machine, gear lapping machine, honing equipment.

I

Illinois Tool Works. 303. Die filing machine, involute profile measuring machine, normal pitch and space measuring machine, gear charting machine, helical lead measuring machine, hob tooth profile measuring machine, lead tester for hobs, cutter testing fixture, shakeproof lock washers, shakeproof tapping screws, shakeproof special stampings.

HOTEL HOLLENDEN—H. C. Smith, F. W. England, C. G. Olson, C. J. Irwin, C. L. Johnson, H. B. Smith, S. O. Bjornberg, C. W. Enstrom, J. M. Gribbie, E. W. Shipman, W. B. Klimmer, A. W. Long, P. J. Nelson, E. T. Oliver, H. M. Howison.

The Ingersoll Milling Machine Co. 810. Milling, boring and drilling machines, cutters.

International Nickel Co. A-505. Metals.

J

The Charles L. Jarvis Co. E-203. Tapping attachments, quick change chucks and collets, flexible shaft machinery, screw driving equipment, flexible shafting.

HOTEL CLEVELAND—M. N. Jarvis, R. Wetzel, F. C. Barker, G. Oles, W. Damrau, W. M. Ziegler, J. W. Gardner.

Jones & Lamson Machine Co. 607. J. & L. pedestal comparator and measuring machine, bench-type comparators, tangent and Hartness self-opening die heads, chaser grinding fixtures, measuring gages and setting blocks, motor driven chaser grinding machines, Hartometer thread gages, turret lathes, Fay automatic lathes, automatic double end milling and centering machines.

HOTEL CLEVELAND.

K

Kearney & Trecker Corporation. 400. Milling machines, hydraulic feed Simplex, mechanical feed Simplex, tungsten carbide face mill grinder, hypoid bevel gear dividing head, wormwheel type dividing head, astronomical attachment for hypoid dividing head, for dividing a circle into one second of arc, rotary tables, thread milling attachment, tungsten carbide display case showing the building of a cutter from the tungsten carbide in powder form to a finished cutter display table of cutters, arbors, and general parts.

HOTEL STATLER—T. Trecker, P. P. Edwards, J. L. Trecker, O. W. Carpenter, J. B. Armitage, J. E. MacArthur, G. L. Erwin, Jr., E. A. Boettcher, G. A. Weber, R. W. Burk, F. G. Jackson, W. J. Mirgeler, G. E. Gustafson, R. Stuart, H. E. Lentzner, I. G. Vanderpan, A. J. Strohmeyer, E. F. Schroeder, J. Riley.

The Kent-Owens Machine Co. 105. Cam feed milling machine, cam feed head machine, standard No. 2 miller, No. 3 R. G. miller.

HOTEL HOLLENDEN—O. Feil, E. G. Schill, A. Happel.

F. A. Kershaw. A-314. Boring tools for lathes, "offset" boring heads for use on milling machines and horizontal boring mills.

E. S. Ferry, P. R. Siegel, F. A. Kershaw.

King Machine Tool Co. 910. Vertical boring and turning machines.

Kingsbury Machine Tool Corporation. 1009. Automatic indexing drilling, reaming and milling machine with unit head construction, four spindle crosshole drilling and burring machine, drilling, tapping and milling units.

HOTEL CLEVELAND—E. J. Kingsbury, G. Swahnberg, B. N. Foster, D. F. Brennan, W. H. Thrasher.

W. B. Knight Machinery Co. 19. No. 4 Knight vertical miller equipped with dial indicators for precision boring, No. 3 vertical miller complete with attachments.

HOTEL STATLER—H. E. Knight, C. W. Knight, W. H. Folkers.

L

Landis Machine Co., Inc. 204. Automatic forming and threading machine, Lanhydro machine, receding chaser pipe machine, little Landis pipe threading and cutting machine, threading die heads, collapsible taps.

HOTEL CLEVELAND—J. G. Benedict, *gen. mgr.*, S. F. Newman, *vice-pres.*, C. N. Kirkpatrick, *secy. and sales mgr.*, G. M. Stickell, *asst. sales mgr.*, R. G. Mumma, *mgr. tap division*, S. W. Mathias, *chief engineer*, M. A. Hollengreen, *asst. chief engineer*, J. G. Harper, *shop supt.*, C. A. Reimschissel, *engineer*, J. G. Morrison, *metallurgist*, J. T. Benchoff, J. W. Frey, J. A. Cover, L. L. Hospelhorn, M. M. Lutz, P. A. Reynolds, M. B. Henneberger.

Landis Tool Co. J-K. Hydraulic crankpin grinder, hydraulic cam grinder, semi-automatic hydraulic grinder with three separate Landis-Solex sizing devices, internal and external race grinders, tool and cutter grinders.

HOTEL CLEVELAND—F. W. Pensinger, R. Forthman, G. Smith, S. Ham, P. Beaver, V. E. Clapsaddle.

The LaPointe Machine Tool Co. D. Broaching machines and tools.

The R. K. LeBlond Machine Tool Co. 1001. Motor-driven heavy duty engine lathe, 14-in. toolroom lathe, universal cutter grinder, automatic lathe, multi-cut lathe, 16-in. rapid production lathe, 11-in. geared-head rapid production lathe, 11-in. motor-in-head lathe, 18-in. Regal lathe, 14-in. super-Regal lathe, 10-in. Regal bench lathe, 14-in. new model tool room lathe.

HOTEL CLEVELAND—H. C. Pietle, L. Roemer, W. E. Groene, B. N. Brockman, C. Carr, L. Goerth.

Lehmann Machine Co. 312. Geared head 16 speed motor driven lathe, 24 in. Hydratrol motor driven lathe.

HOTEL HOLLENDEN—P. Lehmann, *pres.*, A. H. Lehmann, *sec. and treas.*, L. A. Carter, *sales mgr. and chief engineer*, C. Fries.

Leland-Gifford Co. 403. Single spindle, floor type, motor spindle drilling machine with step-by-step hydraulic speed, equipped with fixture to drill deep holes, 12- and 24-in. sizes, 14-in. two spindle machine equipped with hydraulic feed and fixture for drilling oil holes in connecting rods, 12-in. two spindle machine, having motor spindle speed of 10,800r.p.m., 20-in. four spindle, belted spindle, machine equipped with power feed and tapping attachment, 20-in. two spindle, motor spindle machine equipped with power feed and reversing motor for tapping.

HOTEL CLEVELAND—J. E. Arnold, C. H. James, E. A. Heidlinger, T. E. Pouttu, L. L. Lee, A. H. Anderson, H. P. Sawtell, E. F. McCaffrey, S. B. Dowd, E. Lavoie.

The Lincoln Electric Co. E-310. Self-hardening arc welding electrode, 100 amp. welder for use on light materials, alternating current welder, electrode for hard facing and restoring cutting edges on all kinds of tools, motor starter.

Link-Belt Company. E-302. Silent and roller chain, variable speed devices and speed reducers.

HOTEL CLEVELAND—G. P. Torrence, *pres.*, J. S. Holl, *advertising mgr.*, W. C. Carter, *asst. to the pres.*, W. W. Sayers, *chief engineer*, R. F. Bergmann, *asst. chief engineer*, A. H. Boike, *exhibit mgr.*, F. S. O'Neil, *asst. general mgr.*, R. C. Becherer, *shop supt.*, C. J. Brinkworth, L. Harris *supt.*

Lodge & Shipley Machine Tool Co. 1017-18. 10-in.-hole oil country lathe, toolroom lathe, manufacturing engine lathe, special high speed lathe, Duomatic lathes.

HOTEL CLEVELAND—J. W. Carrel, *vice-pres. and general mgr.*, W. L. Dolle, *sec.*, T. C. Stephens, *sales mgr.*, J. N. Stephens, J. H. Myers, H. M. Kordenbrock, H. H. McLaurin.

The Logansport Machine Co. 313. Arbor presses, chucks, cylinders, clamping devices, expanding mandrels, work ejectors, vises, pneumatic and hydraulic equipment,

including presses, drilling machines, line reaming machines, and assembling machines, "Logan" hydraulic forcing press, valves.

HOTEL CLEVELAND—F. G. Payson, *general mgr.*, J. C. Cotner, *chief engineer*, G. O. Hendee, C. Logan, W. L. Battersby, F. T. Donnelly, G. H. Diers, M. Grant, J. C. Fletcher, F. G. Kernan, L. Sheehy.

The Lucas Machine Tool Co. 202. Lucas precision horizontal boring, drilling and milling machines with auxiliary Hi-Speed drive.

F. P. Sprague, R. G. Goring, J. A. Leighton.

The Lufkin Rule Co. A-302. Micrometers, combination squares, calipers and dividers, steel rules, protractors, bevels, gages, and other precision tools.

T. J. Witchger, *chief engineer*, A. J. Lobert, *sales engineer*, W. F. Rockwell, *sales engineer*, R. M. Benjamin, *sales engineer*.

M

Macklin Co. A-416. Grinding wheels.

HOTEL STATLER—Messrs. McIntyre, Breyley, Green, McParlan and Balz.

Madison-Kipp Corp. E-208. Die casting machines.

The Marlin-Rockwell Corporation. E-200. Display of a full line of ball bearings in outstanding spindle applications, super-precision bearings, duplex high preloaded bearings.

HOTEL HOLLENDEN—H. A. Johnston, *sales manager*, A. A. McGowan, *advertising manager*, G. L. Blomquist, *sales engineer*, O. H. Koelker, D. K. Hatch, M. T. Denslow, M. Maierson, F. R. Wren, M. E. Monk.

Master Tool Co. Inc. A-306. Reconditioned tools including cutters, reamers, hand rammers, chipping hammers, paving breakers, and riveting hammers.

A. R. Abeel, E. Nagel, P. J. Hamilton, F. W. Ellsworth.

Mattison Machine Works, 302. High-powered, precision surface grinders.

HOTEL CLEVELAND—A. M. Mattison, *pres.*, C. L. Mattison, *treas.*, A. C. Mattison, *sec.*, C. L. Presnell, *sales mgr.*, G. H. Matthews, *sales engineer*, W. C. Knapp, *sales engineer*.

Micromatic Hone Corp. E-205. Portable automatic engine cylinder re-conditioning equipment.

The Monarch Machine Tool Co. 813. Engine lathes, tool room lathe, Monarch Magna-Matic double carriage automatic lathe, manufacturing type lathe, Monarch Keller automatic form turning and boring lathe, shaft turning lathe, a new cam lock, diameter and length gaging dials.

HOTEL CLEVELAND—W. E. Whipp, P. A. Abe, C. A. Bickel, S. Brandenburg, J. A. Raterman, M. J. Luther, C. Pedersen, J. W. Dunn, C. L. Cameron, H. A. Toy, F. C. Dull.

Morse Chain Co. A-210. Silent and roller chain drive, chain couplings, Pullmore clutches, Kelpo free wheeling clutches.

HOTEL CLEVELAND—W. W. Bertram, *sales mgr.*, R. J. Koch, *asst. sales mgr.*, C. A. Shetter, *Cleveland mgr.*, A. F. Weston, *Cincinnati mgr.*

Motor Improvement, Inc. A-402. Oil filters.

HOTEL STATLER—J. A. Graham, *pres.*, L. Williams, *chief engineer*, H. B. Graham, V. Ellis, F. P. Herman.

Murchey Machine & Tool Co. 209. Taps, die heads, bolts and pipe threading machines.

HOTEL CARTER—C. K. Chapin, *pres.*, A. J. Prance, *vice-pres.*, W. C. Beechner, *sales mgr.*, J. H. Coyle, R. O. Owens.

N

The National Acme Co. 601. Four- and six-spindle screw machines, six-spindle chucking machines arranged with hydraulic chucking, positive clarifier, master and junior chronolog, chaser grinding machine.

HOTEL HOLLENDEN—R. J. Preston, T. R. Strobridge, A. W. Scherer, L. J. Van Wie, R. J. Forkner, C. E. Hartley, A. E. Henn, S. C. Casson, L. E. Grether, C. H. Armstrong, V. A. Armstrong, P. Q. Quay, W. A. Johnson, J. L. Morrissey, H. F. Fussner, H. B. Fritch, E. P. Ranney, F. W. Altorfer, R. M. Sheak, J. H. Clevenger, L. Roberts.

The National Machinery Co. 23-a. High duty heading and forging machines, No. 1 Maxipress, automatic double stroke solid and open die cold headers, automatic precision nut tapper.

HOTEL HOLLENDEN—E. D. Herman, K. L. Ernst, F. J. Mawby.

The New Britain-Gridley Machine Co. 909. Four and six spindle automatic screw machines.

HOTEL CLEVELAND—H. H. Pease, *pres.*, E. L. Steinle, *vice-pres. and sales mgr.*, D. H. Montgomery, *vice-pres. and chief engineer*, T. C. Stirling, L. E. Jolls, G. K. Atkinson, R. E. Clark, D. O. Swanson.

New Departure Manufacturing Co. E-406. New Departure variable speed Transitorq, ball bearings.

HOTEL HOLLENDEN—F. G. Hughes, *gen. mgr.*, L. J. Sigourney, *gen. sales mgr.*, W. H. Harrington, *asst. sales mgr.*, F. W. Marschner, *Western sales mgr.*, G. Fowler, *Chicago mgr.*, C. Beckwith, *adv. mgr.*, T. C. D. Crow, *chief engineer*, A. Madle, *Transitorq engineer*, R. J. Lynch, N. B. Nelson, W. M. Held, and H. G. Wilson, *Chicago sales engineers*, C. H. Allen, C. H. House, G. A. Leyner, L. F. Lavery, and D. W. Nearing, *Detroit sales engineers*, John Collins, *booth attendant*.

Norma-Hoffmann Bearings Corporation. A-401. Ball, roller and thrust bearings, ball and roller bearings equipped with pillow blocks and mountings.

HOTEL CLEVELAND—W. M. Nones, *pres.*, O. P. Wilson, *vice-pres.*, H. J. Ritter, *sales mgr.*, G. R. Bott, *engineering mgr.*, D. E. Batsole, *asst. engineering mgr.*, R. E. Hecker, C. E. Kilham, C. H. Huntonn, *sales engineer*.

Norton Co. 101. Cam-O-Matic for automatically grinding automotive cam contours, automatic plunge cut cylindrical grinder, lapping machine, crankpin grinder, hydraulic traverse machine, surface grinder, "Hyprolap" lapping machine, hydraulic traverse cylindrical grinder, hydraulic traverse universal tool and cutter grinder, universal tool and cutter grinder.

HOTEL STATLER—H. W. Dunbar, *mgr.*, F. W. Smith, H. J. Graffing, C. L. Smith, C. D. Day, Jr., J. R. Leonard, W. E. Wickistrom, G. E. Hulbert.

O

Oakite Products, Inc. A-103. A display in motion called "A Parade of Industries" will feature miniature models of a wide variety of products, produced on machine tools which required several or more cleaning operations before the product is completed.

H. J. Douglas, *vice-pres.*, J. C. Leonard, J. C. McGuire, A. H. Green, C. A. Peterson, L. D. Dunn, J. A. Carter, C. Johnson, A. Copp.

The Ohio Machine Tool Co. 13. Shapers.

The Oilgear Co. 5. Vertical Cyclematic broaching machine, high speed horizontal broaching machine, oilgear hydraulic variable speed transmission equipment with remote electrical control, fluid power feed pump.

HOTEL CLEVELAND—H. M. Swigart, *pres.*, W. Ferris, *vice-pres., and chief engineer*, W. D. Creider, *general mgr.*, G. H. Fobian, *sales mgr.*, E. Weidmann, *asst. chief engineer*, E. C. Wollaeger, I. X. Calhoun, E. H. H. Graf, W. G. Prasse, F. Kuhagen, V. Anderson, W. P. Kimmel.

The O. K. Tool Co. Inc. A-313. O. K. adjustable shankless tool bits and holders, milling cutters, boring heads, cutting tools.

HOTEL CLEVELAND — E. Reaney, F. Schroeder, H. Giller, C. W. Costello.

Oliver Instrument Co. 208. Full automatic face mill grinder, universal tool and cutter grinder, bench model drill grinder, die making machines, drill grinder, face mill grinder, tap grinder, drillpoint thinner.

HOTEL STATLER—E. C. Oliver, R. J. Sack, C. L. Garrison, I. G. Snedeker, R. C. Wilson, U. F. Schwartz.

Oster Manufacturing Co. 7. Pipe and bolt threading machines.

HOTEL HOLLENDEN—A. S. Gould, L. S. Newman, P. E. Willis, P. E. Zuerl, K. W. Reed, S. A. Piasik, E. Koenig, G. Wentz, C. R. Metcalf.

P

Parker Appliance Co. A-308. Component accessories.

The C. F. Pease Co. A-104. Continuous blueprinting, washing and drying machines.

HOTEL STATLER—C. D. McCormick, *advertising mgr.*, H. K. Smeltzly, A. F. Jacobs, J. R. Schwab, A. Bart.

Peerless Machine Co. 4. High speed metal sawing machine, both with and without hydraulic operated bar feeding equipment and conveyor.

HOTEL CLEVELAND—J. R. McDonald, *vice-pres. and general mgr.*, T. J. Santry, *asst. sec.*, A. H. Goetz, *sales mgr.*, O. M. Jensen, *supt.*, F. T. Wruck, *asst. supt.*, I. M. Ward, T. Whitley.

The Pellow Machine Co. E-405. Nut slotting and universal sheet metal working machines.

HOTEL HOLLENDEN—C. E. Pellow, C. S. Pellow, T. N. Solomon.

The Porter-Cable Machine Co. 307-c. Carbo-hydraulic lathe, carbo lathe, lapping machine, belt grinder, type belt grinder, dustless take-about sander, speedmatic electric hand saws.

HOTEL AUDITORIUM—E. J. Riding, R. J. Russell, A. M. Emmons, F. J. Palmer, F. W. Andreson.

Potter & Johnston Machine Co. 602. Two-spindle automatic chucking and turning machine.

HOTEL STATLER—N. R. Earle, *sales mgr.*, J. E. Makant, *asst. sales mgr.*, L. K. Voelk, L. J. Orr, J. P. Cunningham, A. W. Stone, G. T. DuBois, H. I. Schuster, R. H. D. Howat, D. Dott.

Power Transmission Council. E-214. Modern group drive demonstrator.

V. A. Hanson, *chief engineer*, R. E. Walker, Jr., *research engineer*, R. W. Chandler, *chairman of the executive committee*, F. Juraschek, *mgr.*

Pratt & Whitney Co. 906. Lathes, vertical shapers, boring machines, hydraulic vertical surface grinding machines, gear grinding machines, die sinking machines, cutter grinding machines, small tools and gages.

HOTELS CLEVELAND AND AUDITORIUM—C. R. Burt, *pres.*, W. P. Kirk, *vice-pres.*, C. M. Pond, *vice-pres.*, H. D. Tanner, *mgr., machinery div.*, A. S. Keller, *mgr., Keller div.*, A. H. d'Arcambal, *sales mgr.*, E. C. Schultz, *adv. mgr.*, E. J. O'Malley, I. F. Holland, W. R. Back, H. Reichert, H. P. Loewenberg, F. O. Hoagland, R. F. Stanton, J. K. Schofield, E. Sullivan, B. G. Denlinger, C. V. Johnson, W. H. Gourlie, P. T. Harkness, W. H. Miller.

The Producto Machine Co. A-301, 307-a. A-301. Standardized die sets for power presses, accessories for die makers and tool rooms and machines and attachments for tool rooms and power press departments. 307-a. No. 42. Producto-Matic milling machine, No. 28. Producto-Matic manufacturing type milling machine, No. 0 Producto Hand milling machine.

HOTEL HOLLENDEN—N. M. Marsilias, *pres. and general mgr.*, S. C. Rogers, *vice-pres.*, W. J. Grippin, *chairman of the board and treasurer*, W. J. Kaebler, *vice-pres.*, A. J. Cummings, *vice-pres.*, E. Shae, C. A. Wiley, O. A. Olsen, *chief engineer*, M. E. Gombar, *supt.*, E. D. Gaito.

Thomas Prosser & Son. E-105 Small tools, having Widia metal tips.

HOTEL STATLER—R. D. Prosser, W E. Guild, *general sales mgr.*, J. A. Deakin, *asst. general sales mgr.*, E. R. S. Reeder, J. J. Connell, G. G. DeWitt, L. J. Martin, G. W. Mencke, H. Quinn.

R

Racine Tool and Machine Co. 106. Metal cutting machines, hydraulic pumps.

Reed-Prentice Corporation. C. Die casting machine, 14-in. by 6-ft. sliding gear head engine lathe, router and vertical milling machine, vertical milling and die sinking machine, vertical milling and jig boring machine.

HOTEL CLEVELAND—F. W. McIntyre, *vice-pres. and gen. mgr.*, J. A. Benson, *demonstrator*, E. W. Jeffery, E. J. Gillis, G. J. Hawkey.

Reeves Pulley Co. E-290. Reeves variable speed transmission and vari-feed motor pulley, including: inclosed design, vertical inclosed design, electric remote control, electric automatic control, mechanical automatic control and hydraulic automatic control.

HOTEL CLEVELAND—C. M. Reeves, T. B. Reeves, J. H. Gepfert, C. L. Irwin.

Rivett Lathe & Grinder, Inc. 1010. Back-geared screw cutting lathe on cabinet with Rivett speed box motor drive, enclosed head roller bearing lathe on bench, ball bearing open head lathe with automatic slide rest on oil pan, plain bearing lathe on bench with Rivett horizontal safety drive, Blanchard Pulsolator automatic oil lubrication system for industrial machinery.

HOTEL CLEVELAND—T. S. Ross, *pres.*, F. T. Blanchard, *chief engineer*, A. C. Hunt, *treas.*, J. L. Donsanto, *supt.*, A. Anderson, *assembly foreman*, E. Anderson, *assembly foreman*, W. B. Drake, A. J. Moore, M. Fisher.

Robbins & Myers, Inc. A-214. Motors, generators, fans.

Rockford Machine Tool Co. 310 Rockford Hy-draulic shaper-planer, 24 in. Hydraulic shaper.

H. B. Newton, *vice-pres. and gen. mgr.*, P. S. Jackson, *asst. mgr.*, J. G. Anderson, *supt.*, M. Munson, *production mgr.*, P. M. Newton, L. Olsen, and J. Verotyner, *demonstrators.*

The Rockwood Manufacturing Co. E-414. Short center flat belt drives, paper pulleys, V-belt drives.

HOTEL CLEVELAND—W. D. Hamerstadt, S. R. Sayles, J. F. Jenks, L. B. Warner, E. Y. Brown, R. C. Fisbeck, F. W. Parkhurst.

Rotor Air Tool Co. E-314. Portable air grinders, buffers, sanders and drills.

QUAD HALL, 7500 Euclid Ave.—H. P. Bailey, H. C. Burgess, J. R. Clague, F. B. Engeln, A. M. Powell, J. Jacobson, N. T. Lannin, D. S. Linton, C. Meincke, H. R. Voelker, J. Whitney.

S

Wm. Sellers & Co. Inc. 401. Horizontal boring machines, tool grinding machines, drill grinding machines, milling heads.

Seneca Falls Machine Co. 914. Automatic lathes, automatic work drivers, automatic work handling devices.

HOTEL CLEVELAND—M. A. Coolidge, *pres. and treas.*, E. R. Smith, *vice-pres. and general mgr.*, J. A. Fyfe, *sec.*, V. A. Root, W. H. Nettle, R. B. Warman, W. J. Pearson, K. E. Rogers, F. G. Stirling, F. B. Webb, M. C. Day.

The Sidney Machine Tool Co. 1011. Toolroom lathes, engine lathes.

The SKF Industries, Inc. A-102. A specially prepared spindle demonstrating a new principle of roller bearing mounting for lathes, milling machines and similar equipment, a complete display of ball and roller bearings.

HOTEL HOLLENDEN—R. H. DeMott, *general sales mgr.*, R. C. Byler, *advertising mgr.*, G. Palmgren, *chief engineer*, F. E. Ericson, *asst. sales mgr.*, C. Benson, P. R. Payson, R. R. Hirsch, R. R. Zisette, C. R. Mabley, W. C. Clingan. J. B. Castino.

The Skinner Chuck Co. E-400. Chucks.

HOTEL CLEVELAND—P. K. Rogers, R. B. Skinner, A. E. Thornton, K. H. Walther, A. E. Bowers, J. N. Skinner.

The Springfield Machine Tool Co. 800. Geared-head motor-driven tool room lathe, heavy-duty, geared-head, motor-driven engine lathe.

HOTEL STATLER—E. S. Montanus, P. A. Montanus, R. C. Montanus, R. J. Nevius.

Square D Co. A-213. Electrical equipment, switches and panels.

Standard Oil Co. S-4. Cutting oils.

Standard Pressed Steel Co. E-211. Unbrako screws, stools, chairs, work benches.

J. W. Friel, J. P. Price, A. Hall.

Standard Tool Co. E-303. Carbon and high speed twist drills, reamers, milling cutters, taps and special tools.

HOTEL STATLER—R. B. Nuckols, J. B. Green, D. G. MacMillan, F. T. McGuire, T. C. Lange, W. P. Ross.

The L. S. Starrett Co. A-203. Dial indicators, precision tools, tungsten and high speed steel hacksaws.

HOTEL CLEVELAND—D. Findlay, A. H. Starrett, W. D. Starrett, H. E. Masters, A. W. Smith, J. G. Sisson, W. R. Barlow, A. Williams, A. H. Kilburn, W. Thorp.

The Sterling Grinding Wheel Co. A-205. Abrasive grinding wheels.

D. A. Stuart & Co. E-503. Demonstration of the load carrying and wear characteristics of their line of lubricating oils and greases, cutting lubricants, demonstrated by exhibiting alloy steel parts of difficult machinability manufactured by the aid of Stuart oils.

HOTEL STATLER—T. B. Langdon, *vice-pres.*, W. H. Oldacre, *vice-pres.*, W. H. Huelster, *Western sales mgr.*, W. M. Duncan, *engineering dept.*, E. B. Gratton, G. F. Stanford, T. Slivinski, C. H. Baker, B. W. Deacon, C. J. Nagel, J. Y. Umbarger, T. C. Bradford, A. J. McDuff.

Sundstrand Machine Tool Co. 306. Automatic lathe, tool grinders, milling machines.

HOTEL CLEVELAND—H. L. Olson, *pres. and general mgr.*, G. Ekstrom, *asst. sec. and works mgr.*, T. B. Buell, C. H. Rystrom, A. E. Gutzwiller.

Sunnen Products Co. A-413. Portable grinder.

Sun Oil Co. E-505. Sunoco emulsifying cutting oil and Sun pipe threading oil.

R. S. Drysdale, C. B. Harding, J. H. McWilliams, F. O. Karow.

Synthane Corporation. A-404. Laminated bakelite sheets, rods, tubes, gear blanks.

T

The Taft-Pierce Mfg. Co. A-307. Gages, small tools, magnetic chucks, precision reamers.

The Taylor & Fenn Co. 604. Milling machines, grinders, internal sensitive drilling machines.

Thompson Grinder Co. 24. Hydraulic surface grinder.

HOTEL AUDITORIUM—D. Baldenhofer, R. R. Baldenhofer, W. G. Baldenhofer, R. W. Ford, H. F. Smith, I. Wheeler.

The Timken Roller Bearing Co. E-500. General display of Timken bearings for machine tools.

HOTEL HOLLENDEN—L. M. Klinedinst, *vice-pres.*, W. B. Moore, *gen, mgr.*, J. L. Young, *asst. gen. mgr.*, S. M. Weckstein, *asst. chief engineer*, R. P. Kelley, *adv. mgr.*, D. E. Kiefer, J. W. Weir, R. P. Proffitt, G. W. Curtis, J. D. Hutson.

Toledo Pipe Threading Machine Co. 108-c. Pipe threading machines.

W. R. Vosper, R. W. Warnke.

Toledo Scale Co. E-309. Toledo Printweigh attachments, automatic taring attachments, French-type dial scale equipped with double photo-electric cut-off device and electric automatic taring attachment, French-type automatic style counting scale, equipped with 9 to 1 and 99 to 1 ratio counting attachment. Portable automatic dial-type scale equipped with inserted ticker type printing device.

HOTEL CLEVELAND—H. B. Bennett, *pres.*, L. J. Colenback, *vice-pres.*, M. E. Holmes, *industrial sales mgr.*, H. C. Mathias, *chief sales engineer*, D. H. McGhee, M. A. Weckerly, H. O. Hem, W. Summersett, T. Kerstets, Whelan D. R. Bar, F. G. Owen, W. A. Ray, R. B. Longmate, G. W. Crockatt, E. H. Shellberg.

Tuthill Pump Co. A-204. Oil pumps and cups.

HOTEL AUDITORIUM—H. E. Kempton, W. J. Wagner, E. J. Markvart, J. D. Young.

Twin Disc Clutch Co. E-404. Multiple disc clutches.

HOTEL HOLLENDEN—G. M. Guilbert, *sales mgr.*, N. F. Adamson, *chief engineer*, S. Sorenson, *supt.*, W. L. Dixon, R. H. Smith and E. C. Billings, *sales engineers.*

Tyson Roller Bearing Co. A-216. Bearings used in machine tool applications.

HOTEL CLEVELAND—R. H. Maxson, G. C. McMullen, B. L. Crew, F. B. Carney, R. W. Ballentine, H. J. Deal, J. D. Pence, L. J. Held.

U

Union Manufacturing Co. A-311. Electrically and manually operated chucks, electrically operated wrenches, hand operated chain hoists and trolleys.

HOTEL CLEVELAND—C. S. Newman, *pres.*, A. E. Church, *supt.*, C. I. Stevens.

The United States Electrical Tool Co. 102. Electric drills and other portable tools, lathe grinders, high speed tool grinders, bench and floor grinders, floor polishers, flexible shaft machines and accessories.

HOTEL AUDITORIUM—G. E. Smith, *sales mgr.*, L. S. Wallace, L. E. Fries, W. B. Dasilva, T. H. Scaffe, R. Nelson, W. G. Pottgen.

Universal Boring Machine Co. 304. Universal horizontal boring machine having a 5-in. spindle.

HOTEL CLEVELAND—L. F. Marsh, *vice-pres.*, W. B. Robbins, *service engineer*, S. Mader, *designer*, W. Hassett.

V

Vanadium-Alloys Steel Co. E-102. Vascoloy-Ramet and special high speed steel tools in action with a lathe cutting heat-treated steel and cast iron.

HOTEL STATLER—R. C. McKenna, *pres.*, F. Rose, *vice-pres.*, L. Wood, *asst. to vice-pres.*, J. P. Gill, *chief metallurgist*, R. B. George, *metallurgical engineer*, W. R. Mau, F. L. Stevenson, R. R. Artz, G. W. Morrison, E. B. Kitfield, G. W. Remensnyder, M. W. Caruthers, F. W. Potts, C. Sipe, R. B. Weeks.

Van Norman Machine Tool Co. 913. Milling machines, automatic external radius grinder, automatic internal radius grinder.

HOTEL HOLLENDEN—C. E. Van Norman, *pres.*, F. D. Van Norman, *vice-pres.*, J. Y. Scott, *vice-pres.*, H. G. Hoglund, *sales mgr. machine tool division*, L. F. Hunderup, *sales mgr. automotive division*, R. S. Pyne, *sales engineer*, O. F. Johnson, *factory mgr.*, F. P. Healy, *sales engineer*, H. Bordeaux, *chief engineer*, also C. E. Holmes.

Vickers, Inc. E-412. Hydraulic pumps, relief valves, control panels.

V. & O. Press Co. E-315. High Speed Press for notching motor laminations, standard inclinable type press fitted with roll feed, scrap cutter, stock reel and dies.

HOTEL CLEEVLAND—H. Osswald, Sr., C. R. Phiffer, B. B. Patten, E. N. Ekdahl, J. L. Giffen, H. F. Zorn.

W

O. S. Walker Co. 3. Rotary and swiveling type magnetic chucks, single stroke surface grinding machine.

HOTEL CLEVELAND—G. F. Shirley, E. J. LaPorte, H. E. Tracy.

The Warner & Swasey Co. 905. Heavy duty universal turret lathe.

P. E. Bliss, *pres.*, C. J. Stilwell, *vice-pres.*, C. S. Stilwell, *vice-pres. and sales mgr.*, E. W. Gressle, J. R. Longstreet, M. E. Lange, W. K. Bailey, L. M. Cole, A. L. Evans, E. R. Gardner, L. R. Hawkins, G. W. Herkner, A. H. Keetch, G. Kochenderfer, E. F. Kunze, J. E. Kunze, W. L. Loegler, D. M. Pattison, F. J. Pelich, A. Schnaitman, J. F. Slavik, H. R. Ward, R. Strang, E. C. Wilson.

Wellman Bronze & Aluminum Co. A-316. Bronze and aluminum castings.

Wesson Co. A-209. Small tools.

Westinghouse Electric & Manufacturing Co. E-304. Electrodynamic balancing machine, 15-25 and 100-150 ampere contactors, no-fuse circuit breakers, gear motors, fractional horsepower motors, limit switches, magnetic brakes and industrial micarta bearings and gears.

HOTEL CLEVELAND—B. Lester, P. H. Grunnagle, W. D. Turnbull, R. S. Elberty, T. R. Lawson, W. P. Kelly, P. McShane, O. G. Rutemiller, R. H. Clobes, A. M. Jones, G. L. Attig, A. H. Heywood, M. R. Granger, J. E. Payne, C. D. Kester, C. P. Packard, A. C. Delano, J. L. Stewart, S. M. Anson.

The Whitney Mfg. Co. A-315. Roller and silent chain drives for power transmission, chain drives for machine tools.

A. S. Basten, *general mgr.*, R. J. Howison, R. A. Glass, S. C. Smith, E. N. Bidwell.

Whitney Metal Tool Co. 16. Punches and shears, angle iron machinery, press brakes.

HOTEL STATLER—J. Jensen, G. Jensen.

Wiedemann Machine Co. E-313. Turret punches, drop forged steel vises.

HOTEL CLEVELAND—T. A. Wiedemann, E. J. Rollings.

J. H. Williams & Co. A-410. Williams "Non-Sparking" safety wrench, "Agrippa" threading-toll holder.

HOTEL CLEVELAND—J. H. Williams, *pres.*, E. J. Wilcox, *sales mgr.*, A. F. Carew, H. Wisbauer.

The Oster Manufacturing Co.—Williams Tool Corp. 7. Bolt machines, Tom Thumb pipe machines.

HOTEL HOLLENDEN—A. S. Gould, *sales mgr.*, L. S. Newman, *advertising mgr.*, P. E. Willis, P. E. Zuerl, K. W. Reed, *chief engineer*, S. A. Piascik, E. Koeni, G. Wentz, C. R. Metcalf.

Wilson Mechanical Instrument Co. E-104. Mechanical Instruments.

Y

The Yale & Towne Mfg. Co. E-100. Yale electric and hand chain hoist, trolleys, electric industrial trucks, hand lift trucks and skid platforms, Yale pull-lift.

HOTEL CLEVELAND—J. C. Morgan, *general sales mgr.*, S. W. Gibb, *asst. general sales mgr.*, M. G. Peck, C. O. Hedner, C. H. Moeller, F. A. Dewey.

PUBLICATION EXHIBITS

American Machinist A-7

Associated Machine Tool Dealers..... L

Chilton Company (Auto. Industries) . A-2

Industry & Welding..... S-2

Iron Age Publishing Co..... A-1

Machinery A-5

Mill & Factory A-8

Modern Machine Shop..... A-8

The Tool Engineer..... A-6

Railway Mechanical Engineer..... A-1

Steel A-3

Machine Tool Congress Program

Wednesday Evening, September 11

Under the direction of the

Machine Shop Practice Division, American Society of Mechanical Engineers

HOTEL STATLER, BALL ROOM

8:00 p.m. Presiding, Philip E. Bliss, *president,* The Warner & Swasey Company, Cleveland, Ohio.

Opening Remarks by the Chairman of the Machine Tool Congress, C. R. Burt, *president,* Pratt & Whitney, Hartford, Conn.

"Surface Finishing by Cylindrical Grinding," Howard W. Dunbar, *manager,* Grinding Machine Division, Norton Company, Worcester, Mass. (Illustrated).

"Internal Surface Finishing," A. W. Schneider, Heald Machine Company, Worcester, Mass.

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Thursday Evening, September 12

Under the direction of the

Machine Shop Practice Division, American Society of Mechanical Engineers

HOTEL STATLER, BALL ROOM

6:30 p.m. Informal Dinner. Presiding, McRae Parker, *chairman,* Cleveland Section, A.S.M.E.

"Machine Shops in Nazi Germany," Kenneth H. Condit, *Editor, American Machinist.*

8:00 p.m. Presiding, James H. Herron, *Consulting Engineer,* Cleveland.

"Cemented Carbide Cutting Materials," Roger D. Prosser, Thomas Prosser & Son, New York.

"Modern Metal Cutting," Hans Ernst, Cincinnati Milling Machine C., Cincinnati. Motion pictures taken through a microscope, showing the action of a cutting tool in removing a chip.

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Friday Evening, September 13

Under the direction of the

American Society of Tool Engineers

HOTEL STATLER, BALL ROOM

6:30 p.m. Informal Dinner. Presiding, R. M. Lippard, *president,* A.S.T.E.; *Detroit manager,* The Heald Machine Company.

8:00 p.m. "Standardization of Machine and Tool Data," A. H. d'Arcambal, *consulting metallurgist,* Pratt & Whitney Company, Hartford, Conn. Covering the requirements of tool engineers, tool specifiers, and tool designers when specifying and tooling a machine for production.

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Monday Evening, September 16

Under the direction of the

Cleveland Engineering Society

PUBLIC AUDITORIUM, MUSIC HALL

8:00 p.m. Presiding, Joseph H. Gepfert, *president,* Cleveland Engineering Society; *district manager,* Reeves Pulley Company.

"The Place of the Foreman," W. S. Knudsen, *vice-president,* General Motors Corporation, Detroit.

Tuesday Evening, September 17

Under the direction of the

Cleveland Engineering Society

CLEVELAND ENGINEERING SOCIETY ROOMS
HANNA BUILDING

7:00 p.m. Formal Dinner, by the National Machine Tool Builders' Association, in honor of overseas visitors to the Exposition. *By invitation.*

Presiding, F. H. Chapin, *president,* National Acme Company, Cleveland.

8:00 p.m. Presiding, L. E. Jermy, *editor, Machine Design.*

"Tomorrow's Machine Tools," Guy Hubbard, *consulting engineer,* Cleveland.

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Wednesday Evening, September 18

Under the direction of the

Society of Automotive Engineers

HOTEL STATLER, BALL ROOM

8:00 p.m. Presiding, Joseph Geschelin, *Detroit technical editor, Automotive Industries.*

"Methods of Finishing Transmission Gears," S. O. White, *chief engineer;* Marley Hedgeland, *development engineer,* Warner Gear Company, Muncie, Indiana.

"Application of Induction Heating in Automotive Production," E. L. Bailey, *electrical engineer,* Chrysler Corporation, Dodge Division, Detroit, Michigan.

"Rustproofing and Paint Adherence Technique," E. P. Spruance, American Chemical Paint Co., Ambler, Pennsylvania.

"Resistance Welding in the Automotive Industry," J. A. Weiger, P. R. Mallory & Co., Indianapolis.

"A Quick Trip to the Machine Tool Exhibits," John R. Cox, *director of manufacturing,* Thompson Products Company, Cleveland.

* * * *

Thursday Evening, September 19

Under the direction of the

Cleveland Section, Society of Automotive Engineers

HOTEL STATLER, BALL ROOM

7:00 p.m. Production Dinner, informal. Toastmaster, V. P. Rumley, Hudson Motor Car Company, Detroit, Michigan.

8:15 p.m. Presiding, A. T. Colwell, *director of engineering,* Thompson Products Company, Cleveland.

"Where Are We Going From Here?" William B. Stout, *president,* S.A.E.; *president,* Stout Engineering Laboratories.

* * * *

Friday Evening, September 20

Meeting of Machine Tool Congress

HOTEL STATLER, LATTICE ROOM

8:00 p.m. Presiding, C. R. Burt, *president.*

Reports of officers; report of nominating committee and election of directors; adjournment.

Machine Tool Show

Cleveland, Ohio

September 11-21, 1935

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American Machinist

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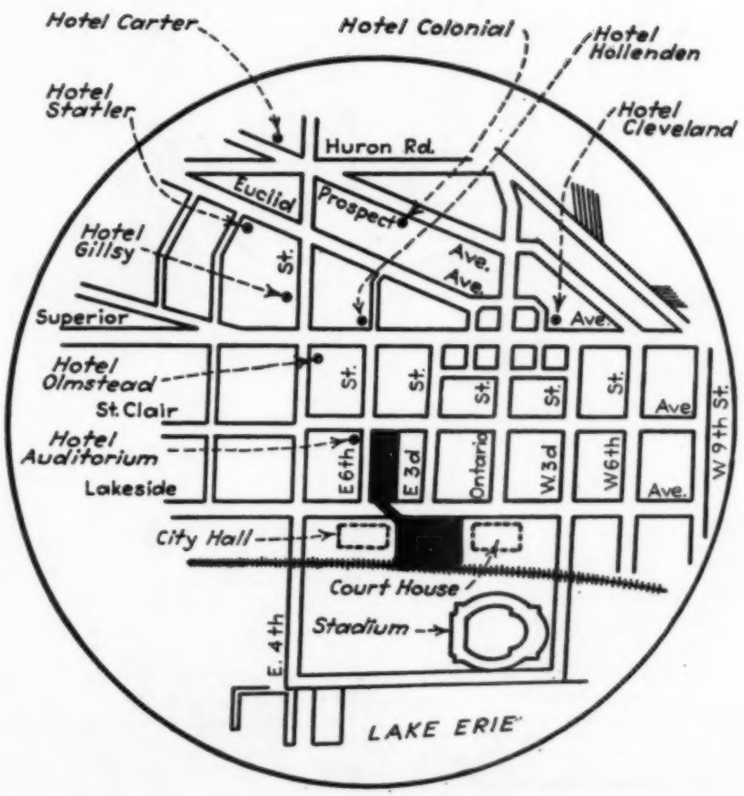
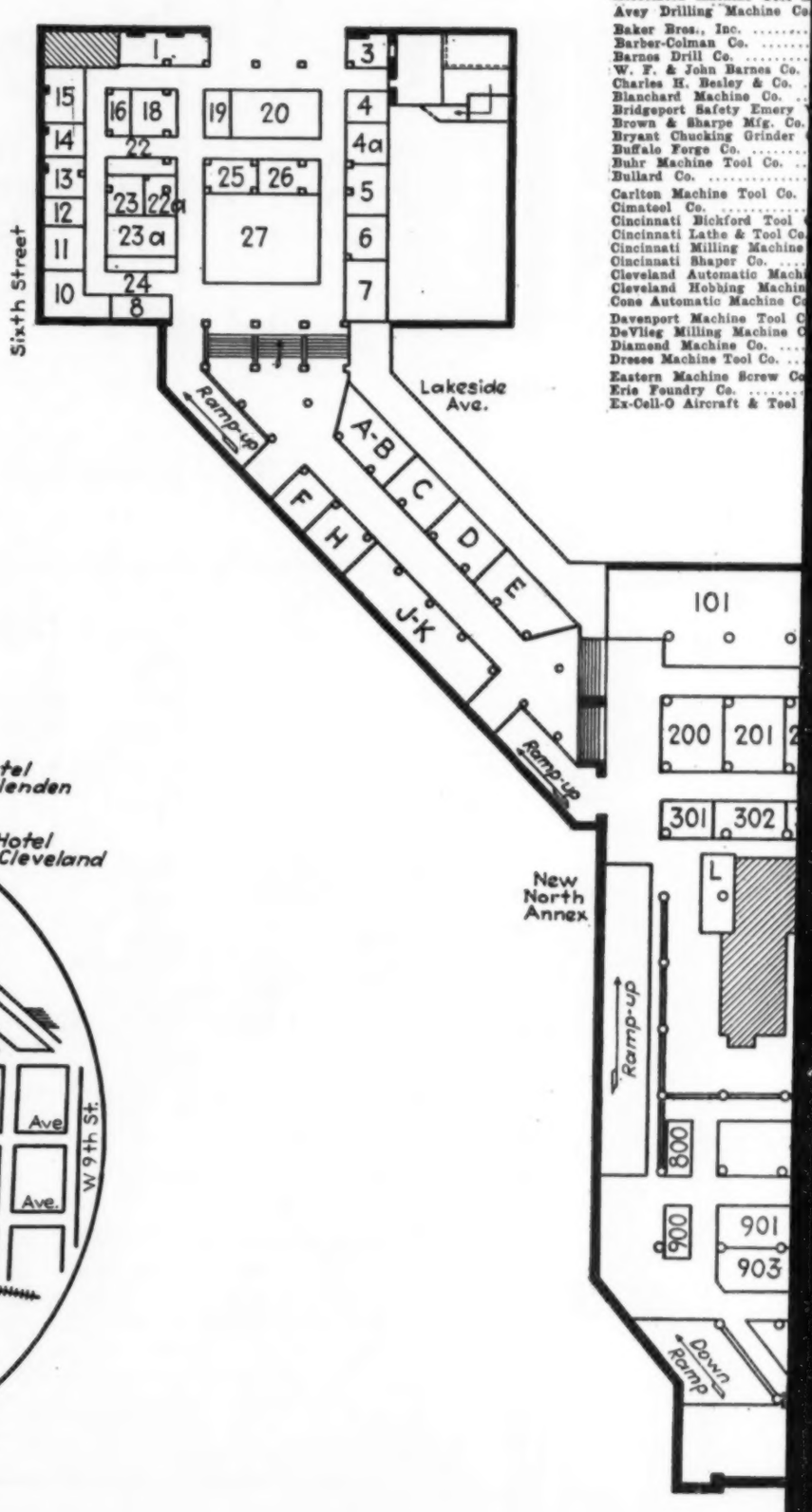


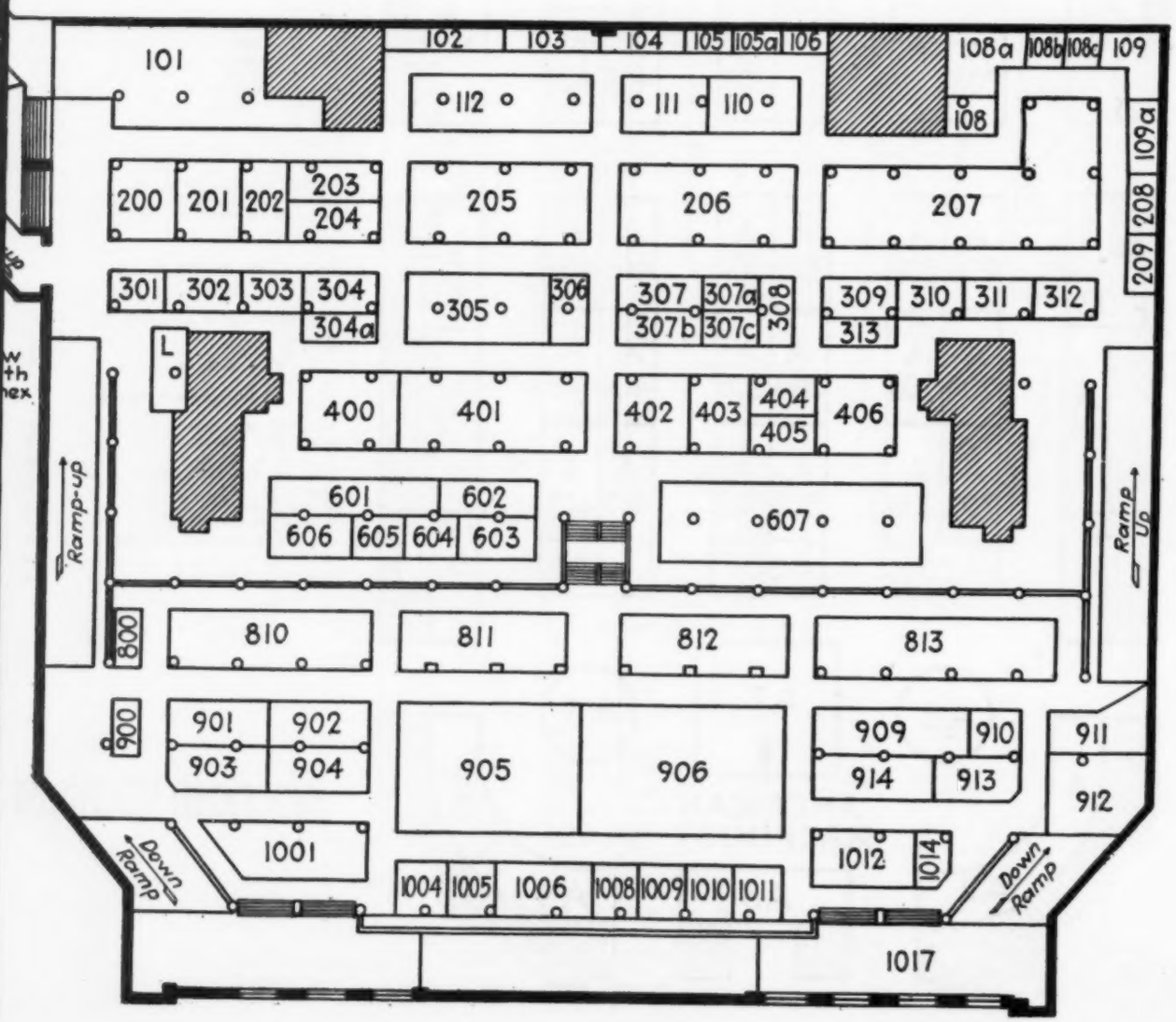


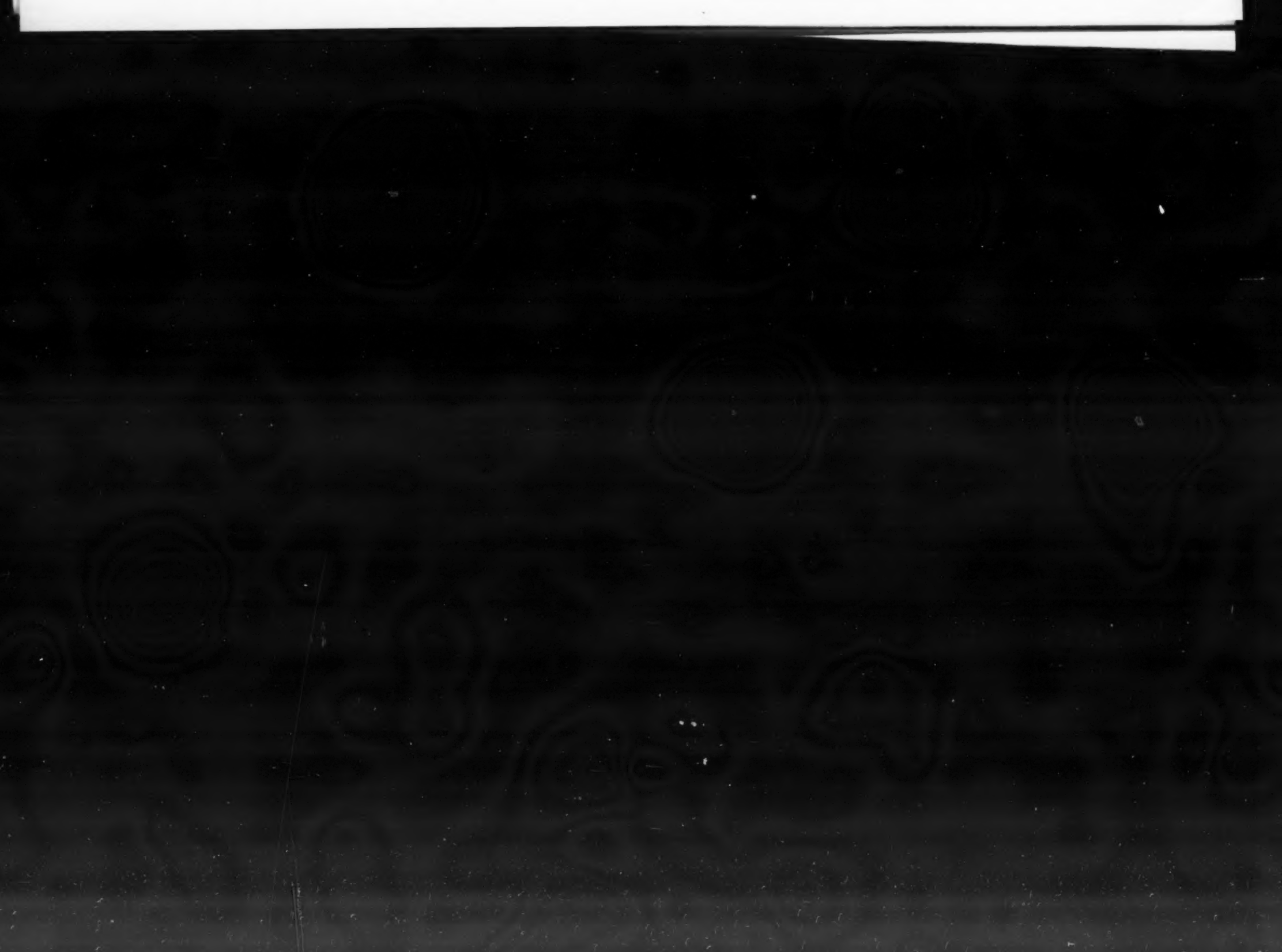
Exhibi

Abrasive Machine Tool Co.
Acme Machine Tool Co.
Acme Machinery Co.
Ajax Mfg. Co.
Charles G. Allen Co.
American Broach & Machine
American Tool Works Co.
Arter Grinding Machine Co.
Associated Machine Tool
Avey Drilling Machine Co.
Baker Bros., Inc.
Barber-Colman Co.
Barnes Drill Co.
W. F. & John Barnes Co.
Charles H. Besley & Co.
Blanchard Machine Co.
Bridgeport Safety Emery
Brown & Sharpe Mfg. Co.
Bryant Chucking Grinder
Buffalo Forge Co.
Buhr Machine Tool Co.
Bullard Co.
Carlton Machine Tool Co.
Cimatool Co.
Cincinnati Bickford Tool
Cincinnati Lathe & Tool Co.
Cincinnati Milling Machine
Cincinnati Shaper Co.
Cleveland Automatic Machi
Cleveland Hobbing Machine
Cone Automatic Machine Co.
Davenport Machine Tool C
DeVlieg Milling Machine C
Diamond Machine Co.
Dreses Machine Tool Co.
Eastern Machine Screw Co.
Erie Foundry Co.
Ex-Cell-O Aircraft & Tool

Exhibits by Members of the National Machine Tool Builders' Association

Abrasive Machine Tool Co.	405
Acme Machine Tool Co.	109a
Acme Machinery Co.	311
Ajax Mfg. Co.	F
Charles G. Allen Co.	15
American Broach & Machine Co.	1005
American Tool Works Co.	901
Arter Grinding Machine Co.	106
Associated Machine Tool Builders	L
Avey Drilling Machine Co.	18
Baker Bros., Inc.	307b
Barber-Colman Co.	903
Barnes Drill Co.	201
W. F. & John Barnes Co.	304a
Charles H. Besley & Co.	1
Blanchard Machine Co.	309
Bridgeport Safety Emery Wheel Co.	25
Brown & Sharpe Mfg. Co.	27
Bryant Chucking Grinder Co.	203
Buffalo Forge Co.	111
Buhr Machine Tool Co.	308
Bullard Co.	205
Carlton Machine Tool Co.	904
Cimatool Co.	108b
Cincinnati Bickford Tool Co.	406
Cincinnati Lathe & Tool Co.	11
Cincinnati Milling Machine Co.	207
Cincinnati Shaper Co.	603
Cleveland Automatic Machine Co.	20
Cleveland Hobbing Machine Co.	301
Cone Automatic Machine Co. Inc.	A-B
Davenport Machine Tool Co.	1006
DeVlieg Milling Machine Co.	8
Diamond Machine Co.	605
Dreses Machine Tool Co.	26
Eastern Machine Screw Corp.	900
Erie Foundry Co.	22
Ex-Cell-O Aircraft & Tool Corp.	812
Farrel-Birmingham Co.	105a
Fellows Gear Shaper Co.	305
Foote-Burt Co.	912
Fosdick Machine Tool Co.	1004
Foster Machine Co.	200
Gallmeyer & Livingston Co.	307
Geometric Tool Co.	103
Giddings & Lewis Machine Tool Co.	110
Gisholt Machine Co.	112
Gleason Works	811
George Gorton Machine Co.	H
Goss & De Leeuw Machine Co.	1008
Gould & Eberhardt	E
G. A. Gray Co.	1012
Green Bay Barker Machine & Tool	4a
Greenlee Bros. & Co.	902
Hall Planetary Co.	14
Hannifin Mfg. Co.	104
Hanson-Whitney Machine Co.	404
Heald Machine Co.	206
Hendey Machine Co.	402
Hoefer Mfg. Co. Inc.	12
Hutto Engineering Co. Inc.	22a
Hydraulic Press Mfg. Co.	1014
Illinois Tools Works	303
Ingersoll Milling Machine Co.	810
Jones & Lamson Machine Co.	607
Kearney & Trecker Corp.	400
Kent-Owens Machine Co.	105
King Machine Tool Co.	910
Kingsbury Machine Tool Corp.	1009
W. B. Knight Machinery Co.	19
Landis Machine Co.	204
Landis Tool Co.	J-K
Lapointe Machine Tool Co.	D
R. K. LeBlond Machine Tool Co.	1001
Lehman Machine Co.	312
Leland-Gifford Co.	403
Lodge & Shipley Machine Tool Co.	1018
Loganspoer Machine Co.	313
Lucas Machine Tool Co.	202
Mattison Machine Works	302
Monarch Machine Tool Co.	813
Murchey Machine & Tool Co.	209
National Acme Co.	601
National Machinery Co.	23a
New Britain-Gridley Machine Co.	909
Norton Co.	101
Ohio Machine Tool Co.	13
Oilgear Co.	5
Oliver Instrument Co.	208
The Oster Mfg. Co.	7
Peerless Machine Co.	4
Porter-Cable Machine Co.	307c
Potter & Johnston Machine Co.	602
Pratt & Whitney Co.	906
Producto Machine Co.	307a
Racine Tool & Machine Co.	106
Reed-Prentice Corp.	C
Rivett Lathe & Grinder Inc.	1010
Rockford Machine Tool Co.	310
Wm. Sellers & Co. Inc.	401
Seneca Falls Machine Co.	914
Sidney Machine Tool Co.	1011
Springfield Machine Tool Co.	800
Sundstrand Machine Tool Co.	306
Taylor & Fenn Co.	604
Thompson Grinder Co.	24
Toledo Pipe Threading Machine Co.	108c
United States Electrical Tool Co.	102
Universal Boring Machine Co.	304
Van Norman Machine Tool Co.	913
O. S. Walker Co. Inc.	3
The Warner & Swasey Co.	905
Whitney Metal Tool Co.	16

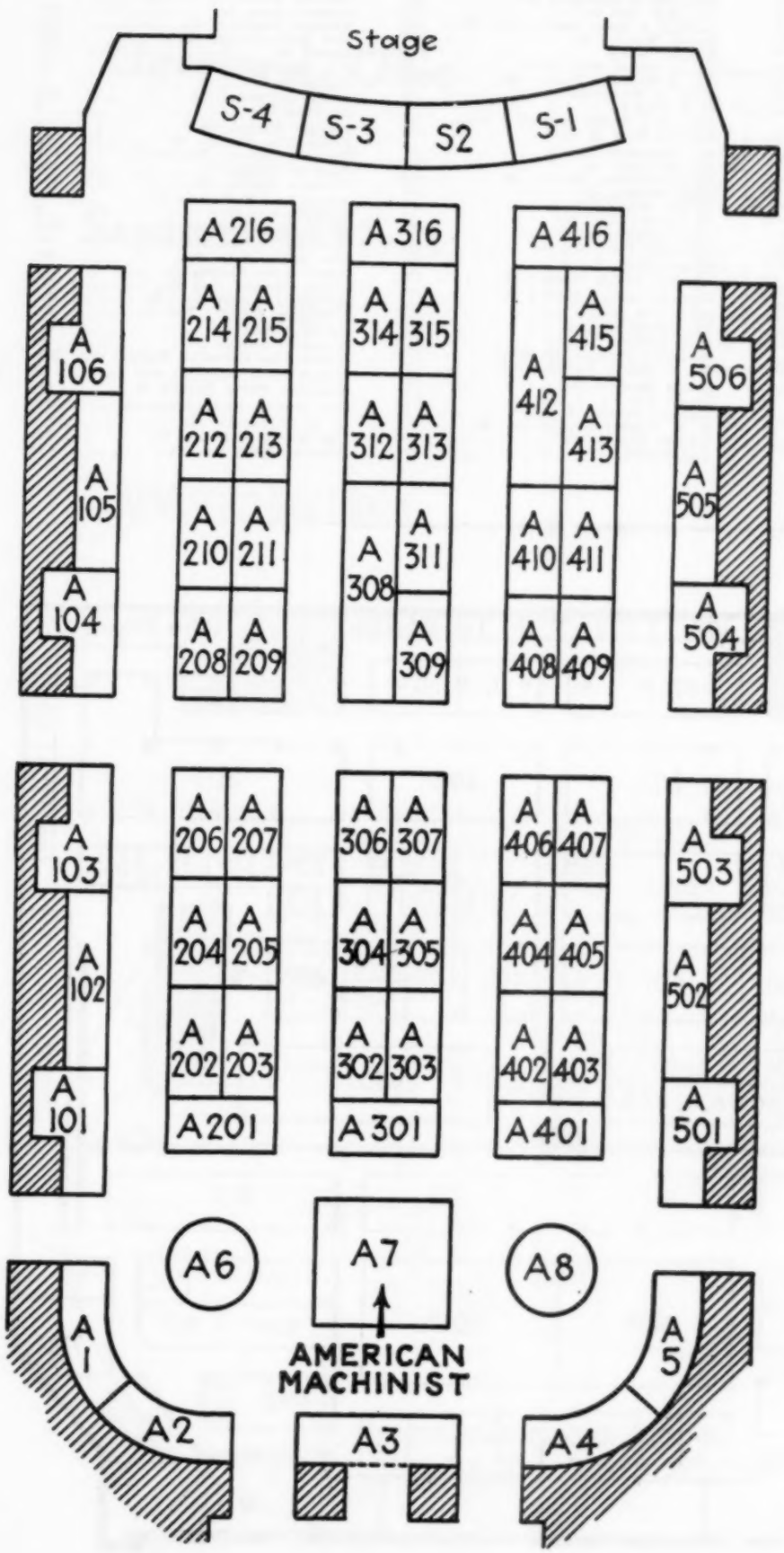




Machine Tool Show

Cleveland, Ohio—September 11-21

Machinery and Accessories Exhibits



Arena Section

Acme Machine Products Co.	A-312
Air Reduction Sales Co.	A-412
American Chain Co.	A-305
Armstrong Bros. Tool Co.	A-304
Leon J. Barrett Co.	A-408
Bausch & Lomb Optical Co.	A-309
John Bath & Co.	A-101
Bristol Co.	A-303
Buckeye Portable Tool Co.	A-407
Bunting Brass & Bronze Co.	A-208
Carpenter Steel Co.	A-501
Century Electric Co.	A-405
Chicago Belting Co.	A-502
Cleveland Worm & Gear Co.	A-105
Clipper Belt Lacer Co.	A-415
Dayton Rogers Mfg. Co.	A-207
Dayton Rubber Mfg. Co.	A-504
DeWalt Products Corporation	A-403
Euclid Elec. & Mfg. Co.	A-202
Fairbanks, Morse & Co.	A-215
Farval Corporation	A-105
Firth-Sterling Steel Co.	A-206
Ford Motor Co.	A-201
Fostoria Pressed Steel Corp.	A-411
Fulton Foundry & Machine Co.	A-212
Gits Bros. Mfg. Co.	A-406
Gogan Machine Corporation	A-211
Hyatt Roller Bearing Co.	A-409
International Nickel Co.	A-505
F. A. Kershaw	A-314
Lufkin Rule Co.	A-302
Macklin Co.	A-416
Master Tool Co. Inc.	A-306
Morse Chain Co.	A-210
Motor Improvements, Inc.	A-402
Norma-Hoffmann Bearings Corp.	A-401
Oakite Products, Inc.	A-103
O K Tool Co.	A-313
Parker Appliance Co.	A-308
C. F. Pease Co.	A-104
Producto Machine Co.	A-301
Robbins & Myers, Inc.	A-214
S K F Industries, Inc.	A-102
Square D Co.	A-213
Standard Oil Co. (Indiana)	S-4
L. S. Starrett Co.	A-303
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Sunnen Products Co.	A-413
Synthane Corporation	A-404
Taft-Peirce Mfg. Co.	A-307
Tuthill Pump Co.	A-204
Tyson Roller Bearing Co.	A-216
Union Mfg. Co.	A-311
Wellman Bronze & Aluminum Co.	A-316
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American Machinist

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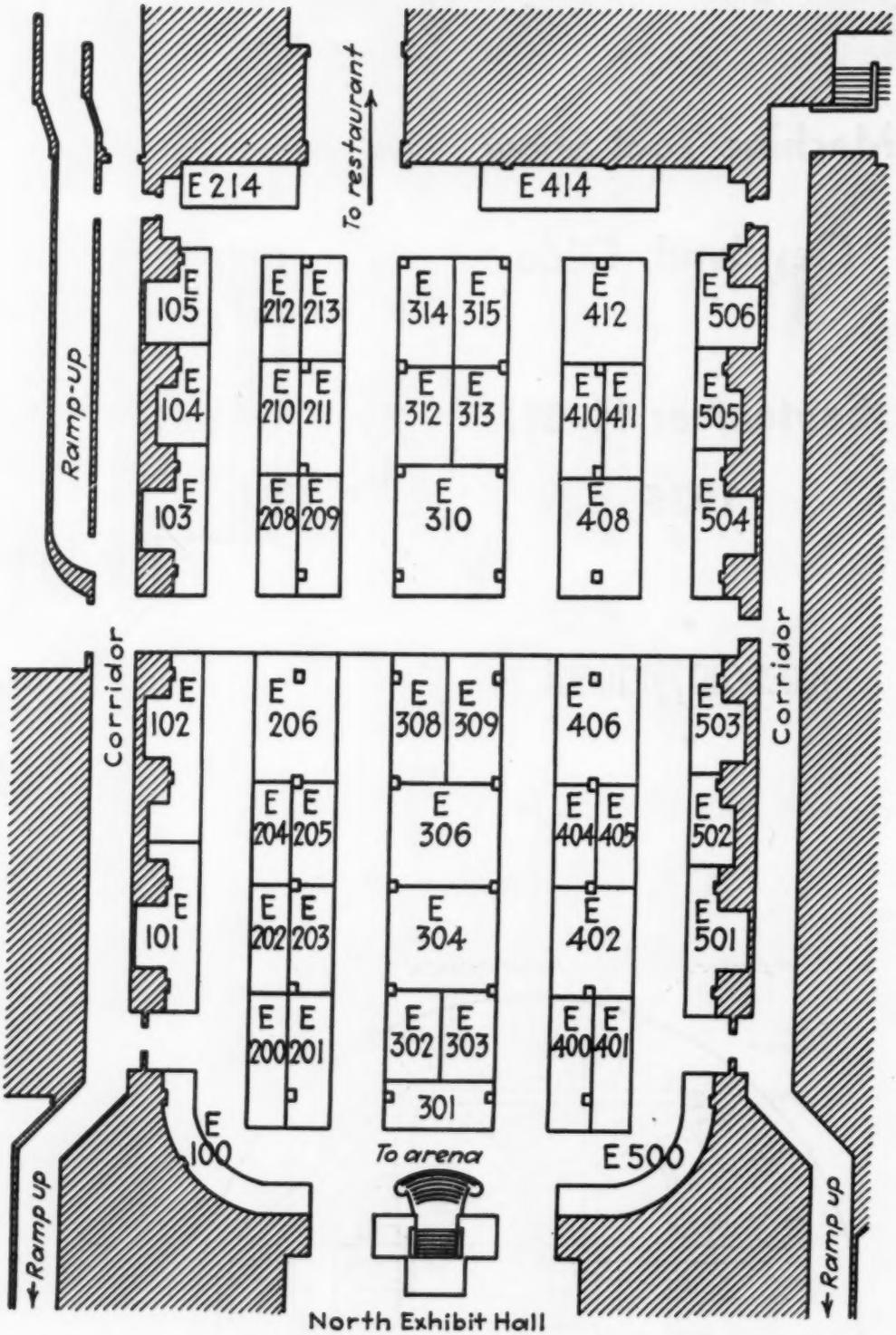

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Exhibition Hall

Ahlberg Bearing Co.	E-301	Harnischfeger Corp.	E-504	Rotor Air Tool Co.	E-314
Louis Allis Co.	E-411	Henry & Wright Mfg. Co.	E-308	Skinner Chuck Co.	E-400
Allis-Chalmers Mfg. Co.	E-401	Hobart Bros.	E-103	Standard Pressed Steel Co.	E-211
Baker-Rauland Co.	E-212	E. F. Houghton & Co.	E-204	Standard Tool Co.	E-303
Barrett-Cravens Co.	E-501	Charles L. Jarvis Co.	E-203	D. A. Stuart & Co.	E-503
Black & Decker Mfg. Co.	E-101	Lincoln Electric Co.	E-310	Sun Oil Co.	E-505
G. S. Blakeslee & Co.	E-202	Link-Belt Co.	E-302	Timken Roller Bearing Co.	E-500
Carborundum Co.	E-408	Madison-Kipp Corporation	E-208	Toledo Scale Co.	E-309
Cleveland Twist Drill Co.	E-306	Marlin-Rockwell Corporation	E-200	Twin Disk Clutch Co.	E-404
Colt's Patent Fire Arms Mfg. Co.	E-210	Micromatic Hone Corporation	E-205	Vanadium-Alloys Steel Co.	E-102
Cushman Chuck Co.	E-410	New Departure Mfg. Co.	E-406	Vickers, Inc.	E-412
Cutler-Hammer, Inc.	E-201	Pellow Machine Co.	E-405	V & O Press Co.	E-315
Elwell-Parker Electric Co.	E-402	Power Transmission Council	E-214	Westinghouse Elec. & Mfg. Co.	E-304
Fafnir Bearing Co.	E-312	Thomas Prosser & Son	E-105	Wiedemann Machine Co.	E-313
Federal Products Corporation	E-502	Reeves Pulley Co.	E-209	Wilson Mechanical Instrument Co.	E-104
General Electric Co.	E-206	Rockwood Mfg. Co.	E-414	Yale & Towne Mfg. Co.	E-100
Greenerd Arbor Press Co.	E-506				

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MACHINE TOOL SHOW

The Show in Print

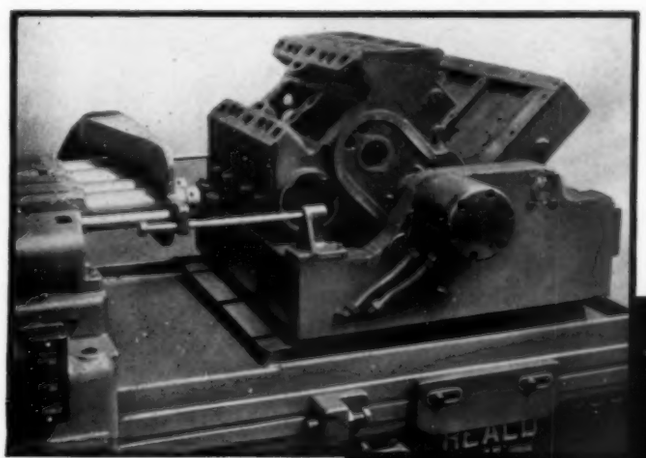
Heald Boring and Grinding Machines

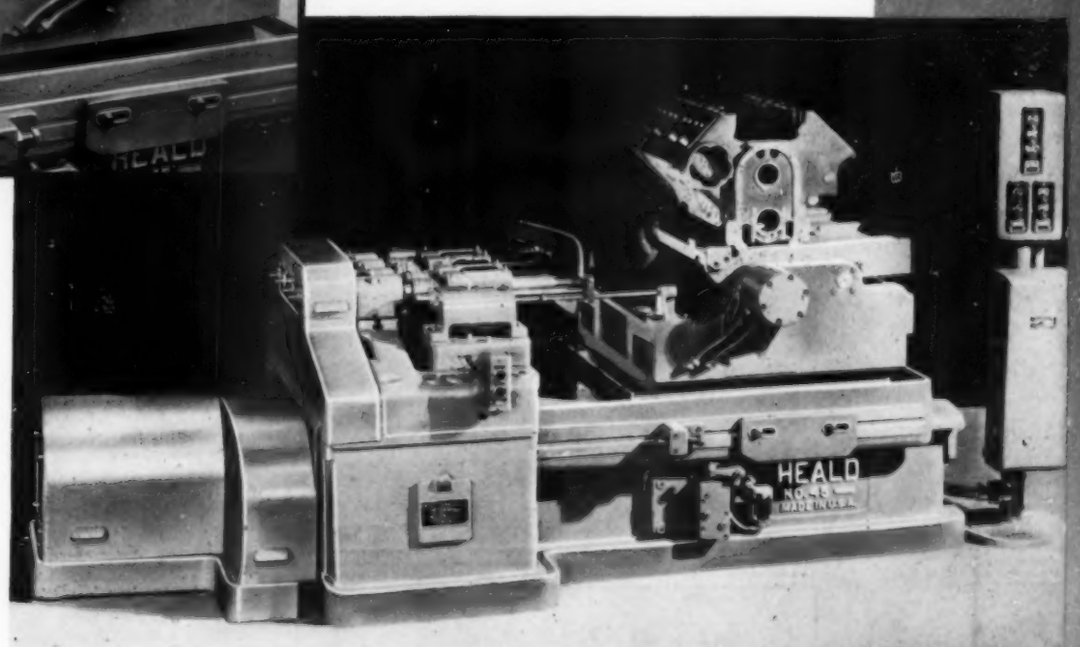
Four machines that reach into new fields of application for precision boring and grinding machines will be exhibited by the Heald Machine Company, Worcester, Mass. These machines are built for such diverse purposes as finish boring V-8 cylinder blocks and grinding medium-size holes in work requiring an unusually large swing.

The No. 45 "Bore-Matic" precision boring machine is intended for "borizing" precision holes in large and heavy, irregular-shaped work of various kinds. The machine illustrated has been developed for borizing cylinder bores in a V-8 cylinder block. Four bores on one side of the block are finished in one pass of the machine and after the block is placed in the reverse position in the fixture, the four bores on the opposite side of the block are borized. Thus, in two cyles of the table, eight bores are completely finished. Speed of the boring spindles can be easily varied by a simple changing of pulleys.

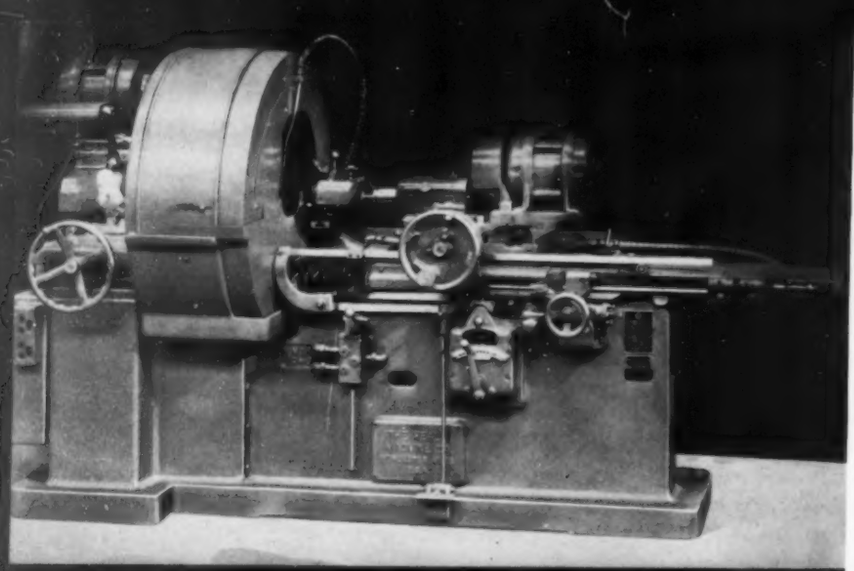
The No. 45 Bore-Matic has a reciprocating table and a stationary bridge for the boring heads. The bridge provides for as many as seven boring heads. Control of the boring and facing feeds is by screw adjustment of a valve. Operation of this valve is from the table cams. The lever that operates the valve also actuates the switch that starts the boring head motor and another cam and switch that stops the boring head motor. The table provides a finished pad with three T-slots.

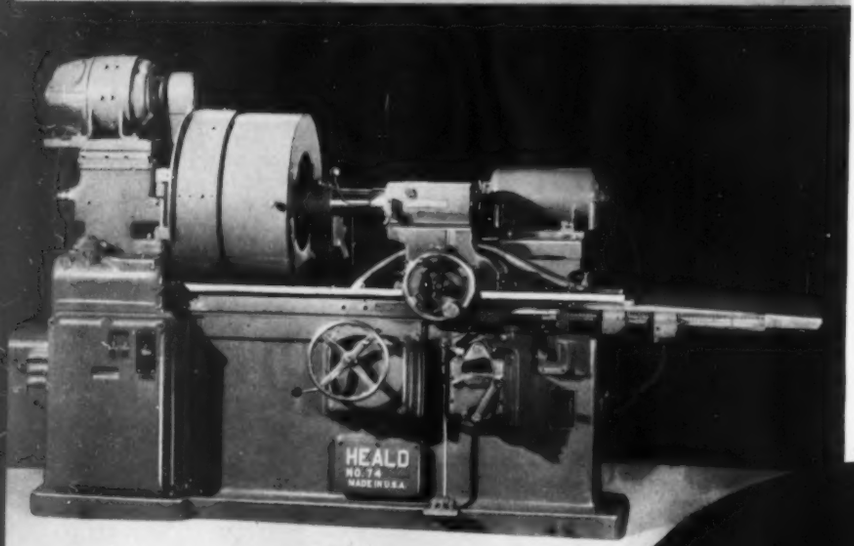
Specifications: Maximum diameter of hole bored, 9 in. approximately; minimum diameter of hole, ¼.





Precision finishing of multiple holes in the same casting, particularly where the work must be handled at the conveyor level, is the field of the No. 45 Bore-Matic. A hydraulically tilted fixture is used for the V-8 block shown above





Top—Medium-size holes in large diameter work can be ground on the Heald No. 72-A internal grinder. Work up to 38 in. in diameter by 15 in. long and with holes to 7½ in. can be taken. Center—No. 74 internal grinder of larger capacity than the No. 72 previously developed. Maximum diameter of hole ground, 20 in.

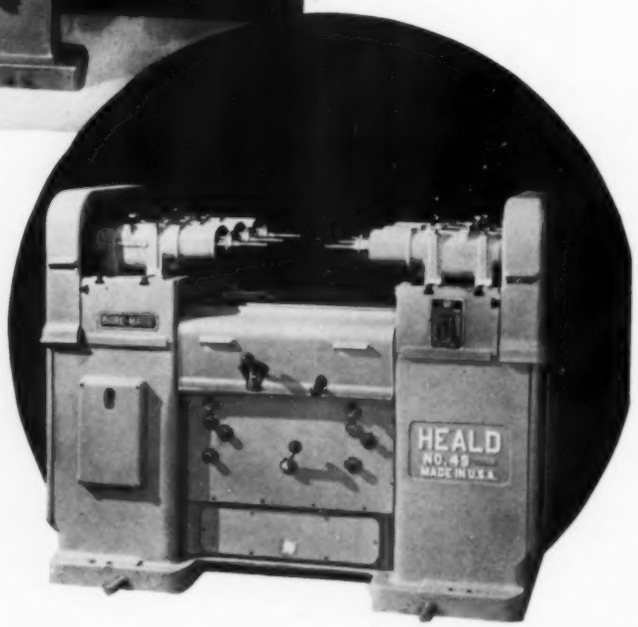
sized boring heads at each end of the machine.

All electric starting and hydraulic controls are built in the base of the machine. Ventilated panel guards at the rear of the machine and guards over the belt and dog unit add to the smooth exterior.

Drive is by multi-strand "V" belts from the motor unit which is mounted on a vibration-dampened plate, to the clutch and brake units which are of the direct hydraulic self-adjusting type also mounted on vibration dampeners. Cams start the boring heads slightly in advance of the reduction to boring speed. Special cams may be made to jump gaps at rapid traverse speed.

Standard equipment includes boring valves and end stops. Facing valves, intermediate stops and arrangements for boring in both directions, and cutting lubricant attachments may be furnished as extra equipment. A coolant reservoir of 8 gal. capacity has also been provided.

On the No. 49 Bore-Matic boring speeds can be easily varied from 360 to 3,270 r.p.m. by simply changing pulley sizes. The distance between the bridges on the No. 49 is 28 in.; the standard maximum table travel is 12 in. The boring stroke between both ends on the standard machine, with 28 in. between bridges, is 11 in. While this gives plenty of room for the usual run of fixtures and work, should more room be required provision has been made for mounting the bridges back 2¼ in. each end to give spacings up to 32½ in. between the bridges, allowing considerably more room for fixtures or for room clearance.



Heald No. 49 Bore-Matic which will bore, face or turn to close limits

in. approximately; maximum length of hole bored depends on hole diameter, but the boring stroke can be 18 in.; net weight of machine, 10,000 lb.

The No. 49 Bore-Matic is a small double-end machine designed for precision boring of several operations in individual parts from opposite ends or a number of different pieces that can be handled at a single setting. It has capacity for four small-

Specifications: Maximum diameter of hole bored, 6⅛ in.; minimum diameter of hole bored, ¼ in.; boring stroke, total of both ends, 11 or 15 ½ in.; net weight, 5,500 lb.

MACHINE TOOL SHOW

The No. 72A gap internal grinder, announced by the Heald Machine Co., Worcester, Mass., was designed to handle gears, plates, connecting rods, housings and similar parts, having medium-sized holes but requiring a large work swing. By providing a heavy T-head base and low work center, a rigid, conveniently operated machine is made available for grinding work-pieces that are usually awkward to handle in a rotating work fixture. The machine has a grinding stroke of 7½ in. and will swing work 38 in. in diameter by 15 in. in length.

This machine is arranged with a hydraulic drive for the table and a quick-acting truing device. A work guard is opened and closed by a hydraulic cylinder and piston at the rear of the machine, having a control valve within easy reach of the operator. This guard swings completely back out of the way to facilitate loading with an overhead crane.

Swing over the table on this machine is 39 in.; floor space, 116x60¼ in.; weight, 9,000 lb.

The No. 74 internal grinder shown is a large machine for handling a wide variety of work. While its general operating features and construction are similar to the No. 72 machine, the unit has been designed for larger capacity.

The base is T-shaped to give support to the workhead. In the lower part of the base is a reservoir for the oil supply. The rear shaft motor, directly coupled to the oil pump and coolant pump, is mounted on vibration dampeners. Switches for all of the motors are conveniently located at the front of the base.

Hydraulic table operation gives unlimited table speeds between minimum and maximum. A large coolant tank eliminates excessive heating. Work-holding fixtures, faceplates, magnetic chucks, radius-truing devices, cross-slide for workhead and other attachments can be furnished as extra equipment.

The workhead can be swiveled for angular work. It is pivoted at the front of the bridge keeping the work near the center of the table preventing overhang and assuring that coolant will run onto the table.

The work guard swings outward on a vertical hinge giving the operator ample space and convenience for loading and unloading. A hole through the spindle makes provisions for a collet operating tube which can be adapted to operate collets or special holding fixtures.

Specifications: Swing over table, 14 in.; swing inside standard water guard, 26 in.; maximum diameter of hole that can be ground, 20 in.; taper, maximum included angle, 30 deg. toward front; weight, 12,000 lb.

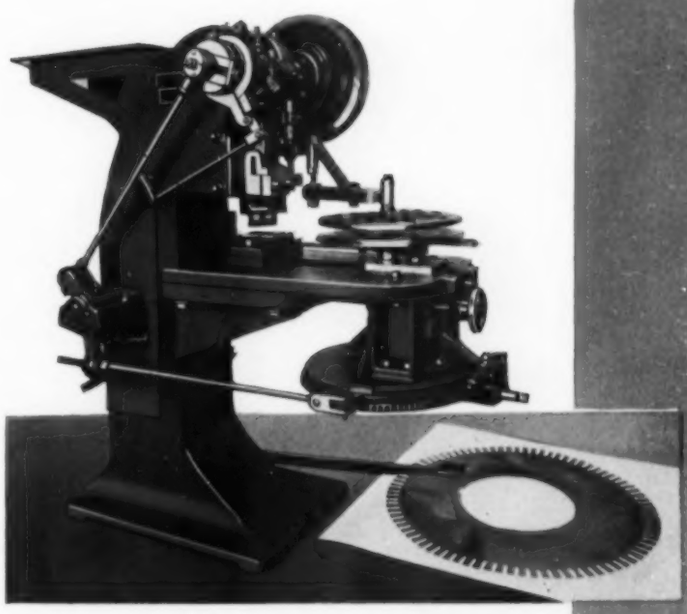
▼ ▼ ▼

V&O High-Speed Notching Press

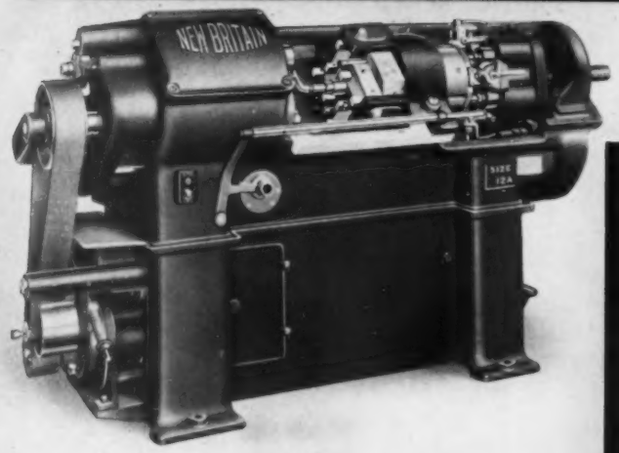
Accurate spacing of the disk notches is secured by several features in the No. 410 high-speed notching press developed by the V&O Press Co., Hudson, N. Y. The range of disk sizes that can be notched is from 3 to 20 in. in diameter, with a maximum 120 notches. The press will operate at speeds up to 650 strokes per min. and is equipped with a New Departure variable-speed transmission. If desired either a rotor or stator fixture can be applied.

A multiple disk friction clutch eliminates shock from engagement at high speeds and also backlash. This gives positive and smoother action. The fully releasable brake is engaged only when the clutch is released. A double-length slide runs in ways of equal length, and adjustment is made by a single loose gib and one set of adjusting screws. These features secure precision of slide travel and accuracy of punch and die registration.

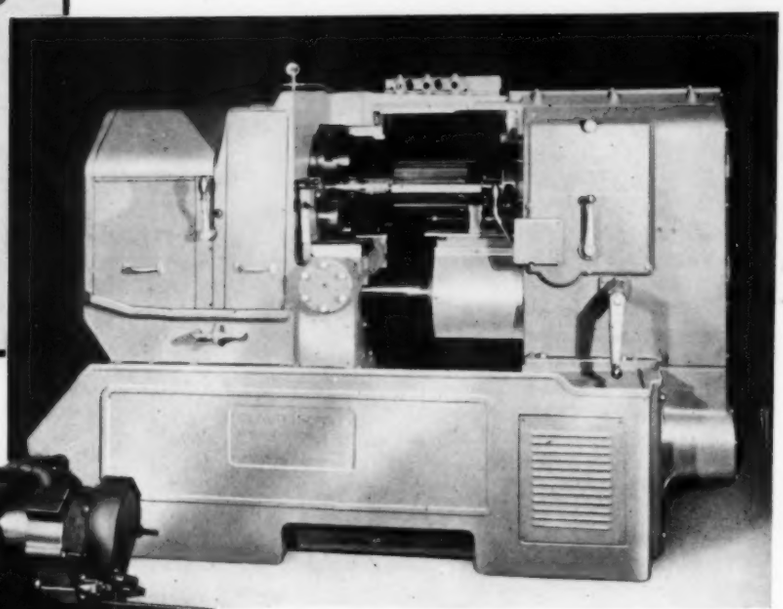
Disks are carried on a friction-driven, positive-locking indexing mechanism which is adjustable in and out for various diameters of laminations by means of a leadscrew having a micrometer dial. The index pawl is confined in a radially adjustable housing so that relation between the keyway and the notches can be secured. It is also so arranged that there is a minimum of wear on the notches or teeth of the index ring.



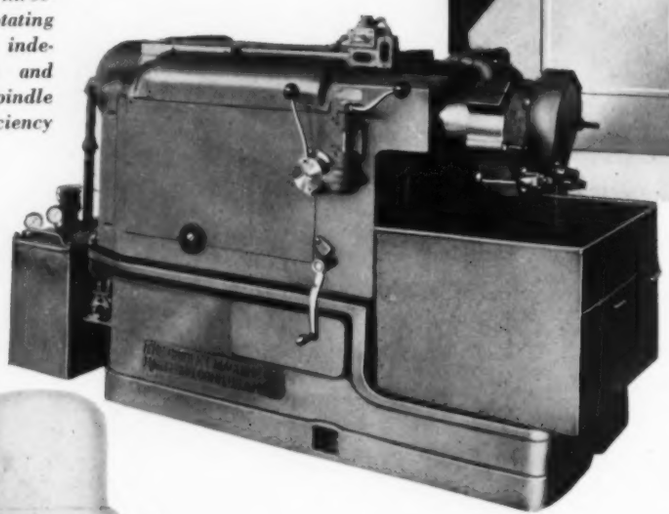
A multiple-disk friction clutch eliminates shock from engagement at high speeds



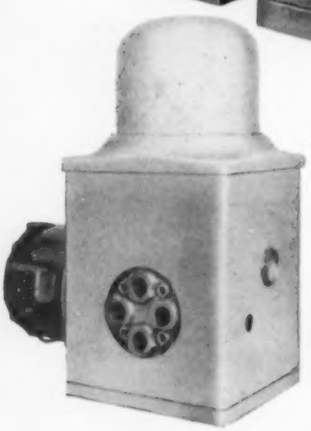
Below—Model 14 four-spindle work-rotating machine has a chuck capacity of 6¼ in.



Above—No. 12A three-spindle, tool-rotating machine with independent speeds and feeds for each spindle for maximum efficiency



Above—No. 38 single-spindle automatic for finishing bearing races and ring gears from tubing or forgings



Left—Chucks or work fixtures can be operated by this hydraulic power unit

New Britain Chucking Machines and Hydraulic Power Unit

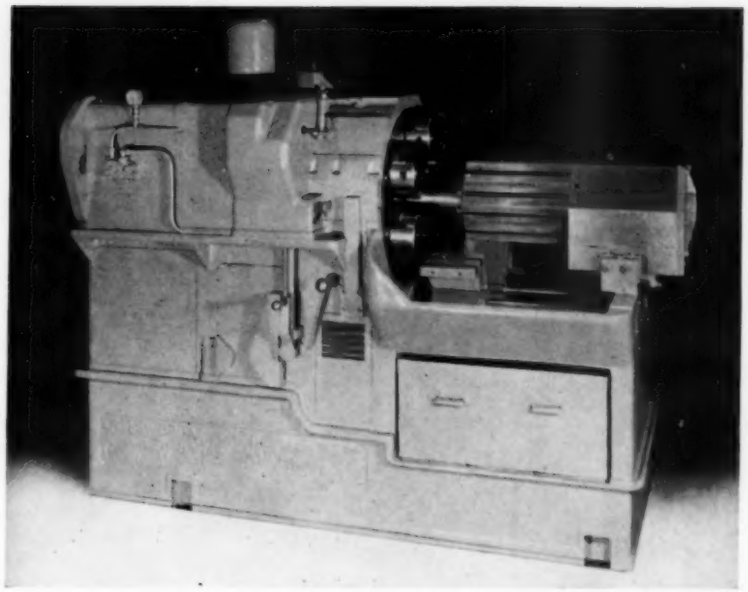
Four chucking machines and a hydraulic power unit for chucks and fixtures are being exhibited by the New Britain - Gridley Machine Co., New Britain, Conn. The No. 12A machine is a three-spindle, tool-rotating type. It represents a further development of that type of machine by New Britain, and offers the rigidity, spindle speeds and accuracy necessary to utilize modern cutting materials. Spindles are provided with independent speeds and feeds so that the correct cutting speed and feed may be secured for each tool. A turret clamping device is automatically released during the indexing period, so that there is a minimum of friction during the indexing cycle

Quick-acting, two-jaw air chucks or special work-holding fixtures reduce operator fatigue to a minimum. The machine is adapted for the finishing of small brass parts from castings or forgings, such as brake fittings, gas, and oil line parts. It has a speed range, however, to make it equally suitable on steel or other material.

Model 14 is a four-spindle, work-rotating type of chucking machine in which the chucks have a capacity of 6¾ in., and are hydraulically operated by a patented mechanism. The wide range of spindle speeds is suitable for modern cutting materials. Extra-large spindles are mounted on pre-load ball bearings. An automatic spindle carrier lifting and clamping mechanism eliminates wear at the vital locating points. Cross-slides are mounted on hardened and ground cylindrical steel studs. A rectangular tool-slide reciprocates on a hardened-steel stem which forms practically an integral unit with the spindle carrier. Auxiliary slides for carrying tools independent of the main tool-slide can be applied in the two upper positions.

The No. 16 machine is a heavy-duty, six-spindle, work-rotating type. It is primarily designed for boring, turning, facing and forming operations on parts up to and including 9 in. in diameter. The tool-slide is hexagonal in shape and reciprocates on a tool-slide stem mounted at each end on anti-friction bearings. The spindle carrier is automatically lifted during the index movement. Forming arms, two in number, have large diameter circular-section bearings and are actuated by individual cams. Chucks are 9 in. in diameter and can be of the two- or three-jaw type. Special work fixtures to suit individual jobs can be applied. The regular chucking pressure is from 50 to 250 lb.

The No. 38 single-spindle, heavy-duty, work-rotating machine is designed for the finishing of rings such as inner and outer bearing races, ring



No. 16 heavy-duty six-spindle work-rotating machine for boring, turning, facing and forming operations on parts up to 9 in. in diameter. Two forming arms are provided

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gears and similar parts from forgings or tubing. Boring, turning and facing tools are carried in arms which are supported on circular-section steel slides. These slides can be operated longitudinally for turning and boring, or transversely for forming and facing operations, and they can be cammed to synchronize the movements to suit individual jobs. A stock-feeding attachment can be applied so that tubing up to 5¼ in. in diameter can be machined. An independent hydraulic chuck operating unit permits adjustable pressures to suit work conditions.

The hydraulic unit is a compact device for hydraulically operating chucks or work fixtures on any type of machine. If the unit is operated with one machine only, then a single-control valve is used, but if with a battery of up to four machines, a multiple-control valve is substituted. A constant-speed, fractional-horsepower motor builds up a reserve pressure against an air cushion in an accumulator. This design permits the rapid action of air chucks with the convenience and smooth action of hydraulic mechanism. Chucking pressures are adjustable within a range from 50 to 300 lb. per sq.in. This unit is available for application to all types of old and new machines.

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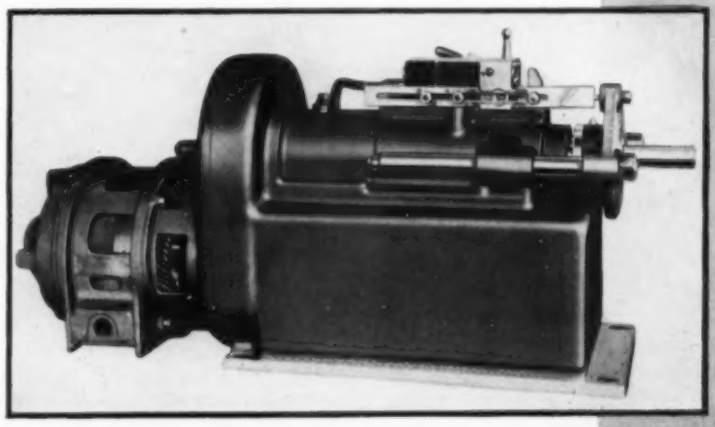
Hoefer Drilling Unit

The self-contained hydraulic feed drilling unit offered by the Hoefer Manufacturing Co., Inc., Freeport, Ill., is sufficiently flexible so that in case changes are desirable the set-up may be altered. The unit, which is obtainable in sizes from 1½ to 10 hp., can be used in any position or at any angle, and any number of units of varying sizes can be mounted on a machine. Several cycles can be obtained.

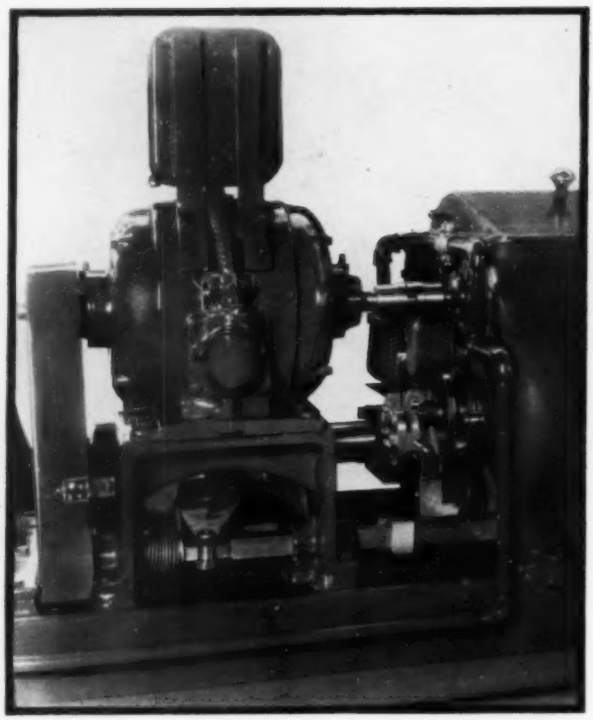
A motor is mounted on the rear end of the unit and its shaft connects directly to an intermediate shaft, which drives the geared pump located within the oil sump. Pick-off gears transmit power to the main spindle.

The self-contained hydraulic circuit consists of a herringbone gear pump, an oil reservoir, a relief valve, a compensating feed valve, a reversing piston valve and a cylinder and piston with through, hollow piston rods. Through this non-rotating piston rod the spindle passes. When the spindle is in the full back position, the pump is completely unloaded. In the rapid traverse positions the full discharge of the constant-volume pump goes through the piston.

While rapid approach and withdrawal speed is constant, 40 in. per min., the rate of the working feed is subject to instantaneous change from zero to 40 in. per min. by means of a knurled screw mounted on the hydraulic valve. The length of the feed stroke, as well as the rapid traverse is subject to change by means of trip buttons.



Sizes from 1½ to 10 hp. are built for machine application



National Acme Single-Spindle Automatic Screw Machine

Many pieces being made on automatic screw machines are essentially simple; requiring only forming, drilling and cut off. There is a field for a simple, inexpensive machine, easily tooled up, sufficiently so that cutting tools can be pushed to the highest practicable speeds and feeds, and one which may be entrusted to an operator of moderate skill.

To meet these requirements the National Acme Company, Cleveland, Ohio, will demonstrate the single-spindle automatic screw machine. Working parts of the machine are waist high, and so arranged that the operator from one position can effectively oversee the details of the operation. It is intended to reduce idle time to a minimum and afford as nearly as possible continuous production of the piece.

In order to reduce the time required for restocking, provision is made for handling 20-ft. lengths of bar stock. This is fed into the spindle by tension continuously exerted on it by a spring-operated drum mounted in the base of the machine. The bar is placed in a slotted stock tube. A follower attached to the outer end of a steel cable slips into the tube, and the other end of the cable is wound around the drum. This method of feed eliminates the necessity for the usual pusher and pusher tube, feeding cam and roller.

The chucking mechanism is operated by a cam drum on the headstock of the machine, operating through the usual chucking spool and collet, and a hand lever is provided to permit hand chucking, when required, from the operating position.

The stock is fed out against the drill in most cases. When drilling is not required, as in cutting-off pins, a stock stop is mounted in the drilling spindle. A separate, independently cammed disappearing stock stop may be furnished as optional equipment. The drill spindle may be stationary or rotating.

When changing over from one job to another, the operator can adjust the depth of hole to be drilled by turning an adjusting screw on the front of the machine, and without changing the cam. The feed of the drill spindle is controlled by a cam on the drum referred to above, moving a horizontal rod at the rear of the table. This rod moves the spindle through an adjustable cross-head. A pin is provided at the front of the spindle-operating lever, so that by lifting out this pin the operator may slide the spindle back and examine or replace the drill without in any way disturbing the adjustment.

Two cross-slides are mounted rigidly on the face of the heavy box-form casting which encloses the gears. One of these slides carries the chamfering or forming tool, the other the cut-off tool. Taper gibs are provided for quick adjustment in case of wear. Each slide is independently operated by a hardened steel disk cam, which is readily accessible. A heavy spring opposes the forward motion of each slide into the work so as to keep the roller firmly engaged with the cam and give accurate depth of cut.

For maximum convenience in setting up, a crank

and squared shaft are provided for turning the machine over by hand, and a clutch lever on the gearbox of the machine is conveniently placed for starting and stopping. The clutch is of the multiple-disc type, mounted inside the gear box.

In order that the operator will not have to remember to oil the moving parts of the headstock of the machine, the entire assembly runs in a bath of oil. The work spindle and all of the shafts in the gear section of the machine are mounted on precision anti-friction bearings. All bearings and gears are run in a bath of oil. The drive motor is also provided with anti-friction bearings. A coolant pump is driven by main drive motor and draws coolant from a sump in the base of the machine and delivers it in large volume, at low pressure, at the cutting tools.

Spindle speeds are changed by changing the drive sprocket in the gear case, which can be done in a few moments; tension on the silent chain in the gear case can be easily adjusted. Change gears in the gear box permit changing feeds on the cross slides; these are spur gears; the remainder of the gears are helical.

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Landis Type C Hydraulic Grinder

Because certain parts may be more economically ground on machines arranged for semi-automatic operation, the Landis Tool Co., Waynesboro, Pa., is now offering the 10-in. Type C hydraulic grinder tooled in this manner. The machine illustrated is set-up for the grinding of multi-diameter shafts. Greatly varying diameters of the same shaft may be ground. In the case shown, five main bearings of a camshaft are being done in one set-up. While grinding takes place an operator can easily load and unload a second machine.

The standard 10 in. Type C plain hydraulic bed is used. The headstock is also standard, although when grinding certain parts some special work driving means may be required. The footstock spindle is hydraulically operated. Basically, the wheel base is standard with the wheel spindle drive through multiple V-belts, babbitt-lined steel wheel-spindle bearings, bearings and spindle continuously lubricated with filtered oil, and other typical Landis features. A conventional plain feedup handwheel is provided in order that wheel wear may be compensated for. A standard reciprocating spindle mechanism is quite convenient to stop the reciprocation during the truing of the wheel.

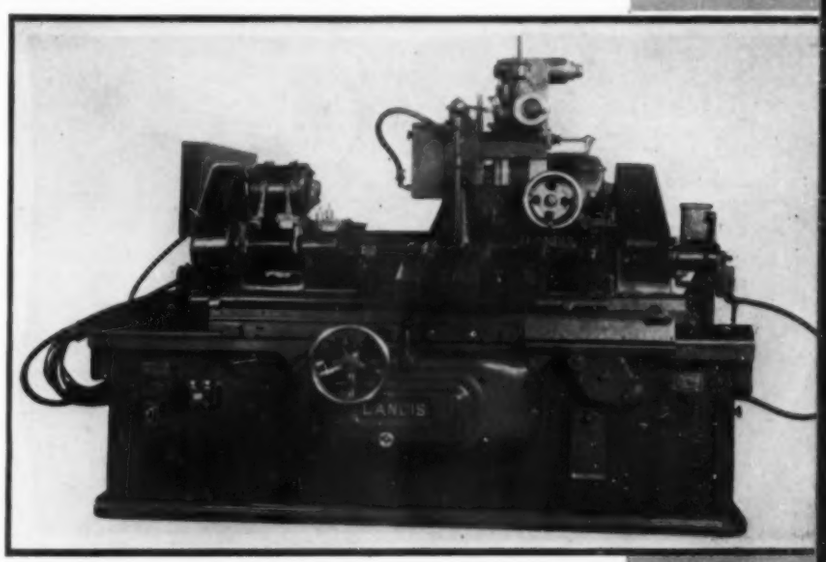
Five bases are mounted on the table between the workheads. Only the center three are used for workrests. Parts having a different number of diameters than the camshaft illustrated would require a different number of bases with the quantity of workrests determined by the length and characteristics of the parts. The rest shoes are so designed that while supporting the shaft they more or less grip it at the top and bottom to prevent springing from grinding pressure. All five of the bases act as carriers for the sizing heads. Hydraulic power actuates the movement of both the workrest shoes and the sizing heads. Brackets attached to the two end bases extend upward and act as the work cradle.

The Landis-Solex pneumatic sizing device is employed. A separate sizing head is provided for each of the diameters to be ground.

Unusual Hydraulic Infeed

An unusual feature found in this machine is the arrangement in connection with the hydraulic infeed which compensates for the different point at which grinding begins when varying diameters are being ground. If the usual hydraulic infeeding arrangement were used, the grinding feed would engage at the same point for each bearing. This would mean that when moving forward to grind a smaller bearing than the one ground previously, the base would have to feed in a slight distance at the slow grinding feed before the wheel would come in contact with the work. To eliminate such a time loss, a movable bar in which are inserted pins of various lengths, is located underneath the wheel base. Movement of the bar is timed with the traversal of the carriage so that the correct pin is brought into play for each diameter being ground.

The wheel truing mechanism is of the hydraulically operated type. A notched spacing bar is attached at the front of the bed, and a hydraulically operated plunger brings the hydraulic table traversal to a stop at the correct time so as to position each bearing properly in one of the grinding wheels. The whole arrangement is quite similar to the one used in connection with the Landis 5-in. hydraulic cam grinders. The foot stock spindle is also hydraulically operated.



Ex-Cell-O Thread and Tool Grinders, Drilling Machine and Power Unit

Four new products—a precision thread grinder, a carbide tool grinder, a vertical hydraulic drilling machine, and a hydraulic power unit—are to be at the booth of the Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman Blvd., Detroit, Mich. The precision thread grinder is a self-contained, motor-driven machine designed for wet grinding either right or left-hand threads on screw, taps, chasers and worms. Eccentrically relieved taps or chasers, either right- or left-hand continuous threads, and multiple threads can also be ground on this machine by the use of a suitable indexing fixture.

Top — Precision thread grinder which takes 5x18 in. between centers. Threads can be ground on heat-treated work. Right—Multiple-spindle heads can be attached to spindle flange of this hydraulic drilling machine

This machine takes 5x18 in. between centers. A grinding wheel 18 in. in diameter and $\frac{5}{16}$ in. thick, having a 9-in. hole, is supplied. Wheel spindle is mounted on a swivel having graduations in half degrees, so that it may be swung in a vertical plane to a maximum of 15 deg. in either direction. This spindle is mounted in Ex-Cell-O precision ball bearings.

Threads can be ground on heat-treated work from the solid blank, holding a tolerance on the lead not to exceed 0.0002 in. error per in. in length, or an accumulative error not in excess of 0.0006 in. on longer work.

To the work drive spindle is attached an interchangeable master leadscrew which is selected to suit the pitch required by the customer. The two-speed motor which drives the work head is provided with a four-step pulley. This furnishes slow work speeds of 31, 55, 82 and 100 r.p.m. in one direction and fast work speeds of 62, 111, 165 and 200 r.p.m. in the opposite direction.

A work-positioning and backlash device is used on this machine. This permits the proper positioning of the thread groove in the work in proper relation with the grinding wheel when the work has been previously threaded. When grinding threads from a solid blank it is used as a backlash compensator for grinding in both directions. A back-off attachment is furnished for grinding relieved threads.

Manufacturing-Type Drilling Machine

The vertical hydraulic drilling machine is a single-purpose, heavy-duty manufacturing type. A hydraulic power unit with a maximum stroke of either 8 or 10 in. is available and can be adjusted to the requirements of a particular operation. Rapid traverse, feeds, reverse and stop are controlled by adjustable dogs. Two forward feed rates are independently adjustable from the outside of the unit. Depending on requirements a 2-, 3-, 5- or 7½-hp. motor can be furnished.

A flange is located on the end of the quill for mounting multiple-spindle heads. A machined pad is located on each side of the base and the unit for mounting guide-bar brackets.

The table of the machine is furnished with adjustments in 3-in. steps which provide the necessary table heights. On applications where coolant is required, a vertical motor-driven centrifugal pump is mounted at the back and at the base of the machine column. Push-button control for operating the electrical motors and the operating lever on the hydraulic power unit are located within easy reach of the operator.

In the improved carbide tool grinder presented by the Ex-Cell-O Aircraft and Tool Corp., Detroit, Mich., a built-in ¾-hp. motor is mounted in the main casting at the top of machine and drives two diamond wheels. A reversing switch provides the correct rotation of the wheels for right- or left-hand tools. To obtain a correct rake and angle on each tool, an adjustable tool support table is located at each end of the machine. A horizontal slot is provided in the face of each table top to guide a tool support across the face of the diamond wheel.

Versatile Hydraulic Power Unit

Compact and self-contained, the hydraulic power units are adapted for drilling, reaming, counterboring, spotfacing and similar operations. They can be mounted either singly or in multiple and are not limited to any one position.

The smaller unit, No. 23A, has an 8-in. stroke; the larger unit, No. 25A, has a 10-in. stroke. Feed range on the No. 23A unit is 1 to 32 in. per min. with a rapid approach and return of 300 in. per min. Range on feed on the No. 25A unit is 1 to 32 in. per min. with a rapid approach and return of 230 in. per min. Adjustable dogs control the rapid approach, feeds, return and stop. Two forward feed rates, independently adjustable from the side of the unit, permit selection of the proper ratio while the unit is feeding to suit drilling, counterboring, spotfacing or similar operations.

An electric motor mounted on top and at the back of the unit, drives the hydraulic pump by means of V-belts. The pump shaft is connected through change gears to the spindle driving shaft. Spindle speed can be changed by removing the cover plate at the rear of the unit.

Right—Two diamond wheels are employed in this tool grinder for carbide cutting materials. Below—This power unit is adapted to drilling, reaming, counterboring and spot-facing operations. The unit can be used singly or in multiple

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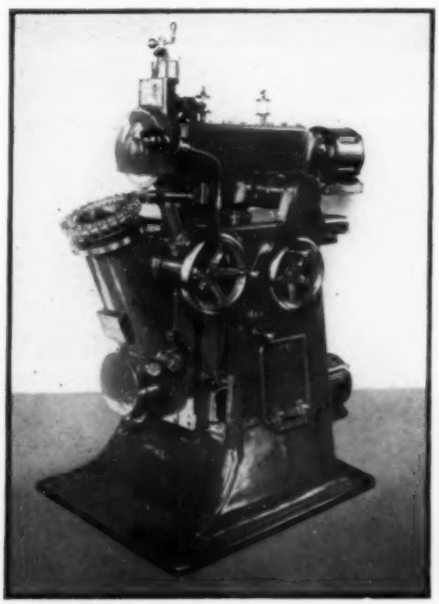
Oliver Face Mill Grinder

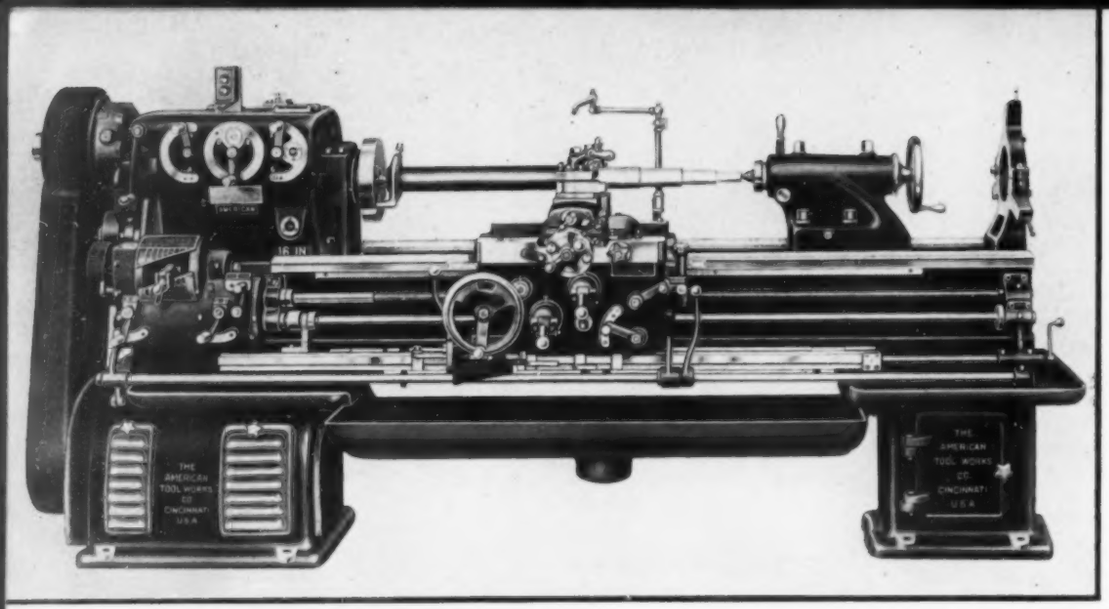


No index plates are used in this face mill grinder

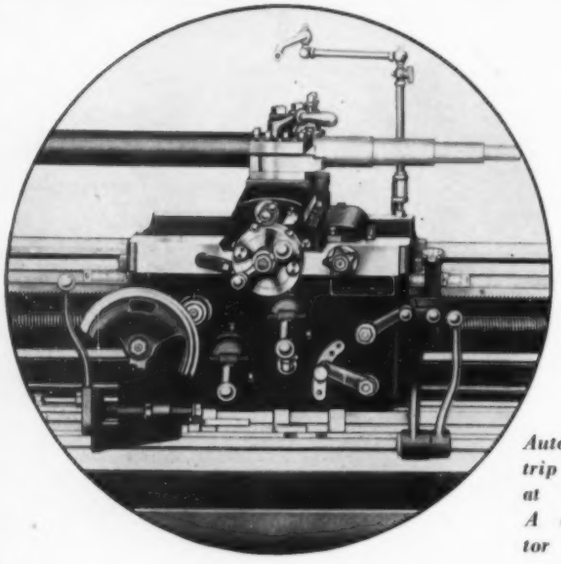
Face mills are sharpened on the entirely automatic face grinder offered by the Oliver Instrument Co., Adrian, Mich. The cutter is mounted on a work spindle which is mechanically indexed to bring each tooth under the grinding wheel. The cutter is held in proper relation by means of a lip rest attached to a ram that carries and reciprocates the wheel. No index plates are used, the adjustment for various numbers of teeth being made in the index mechanism. The form of tooth is governed by a hardened cam which may be varied to suit the special use for which the cutter is intended.

In grinding a cutter having tungsten-carbide inserts, it is not necessary to back-off the carbon steel blade as the wheel cannot load because at each reciprocation it passes over a diamond dresser. Two speeds are provided, 15 strokes per min. for roughing and 7½ strokes per min. for finishing.

All shafts are mounted in ball and roller bearings and the machine is sturdily built throughout. Gearing within the body traverses the ram and actuates the index mechanism.



The 20 in. size, but the range of sizes is 12 to 36 in.



Automatic longitudinal stops trip the longitudinal feed at predetermined points. A center hole compensator is offered as an extra

AMERICAN LATHE, RADIAL DRILL AND SHAPER

The multi-production lathe was developed by the American Tool Works Co., Cincinnati, Ohio, for the purpose of filling the gap between the standard engine lathe and the highly specialized, single-purpose, automatic lathe. By retaining all the standard engine lathe features it offers the same adaptability and range as a standard lathe, while through its combination of automatic length stops, positive diameter stops, and special tooling it offers the advantages of very rapid production of duplicate parts.

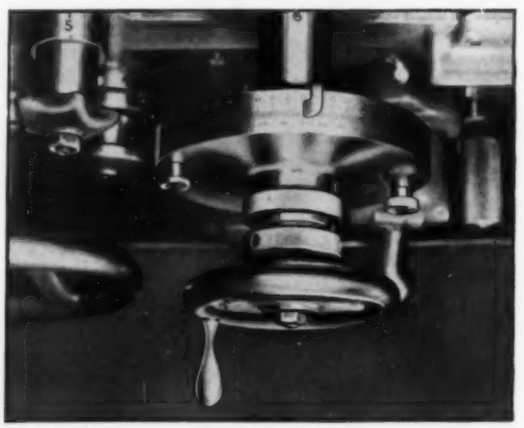
Multi-production features consist primarily of a highly developed automatic longitudinal stop mechanism, a set of positive, hand-operated diameter stops, and tool rests especially adapted to the work. The longitudinal stops automatically trip the longitudinal feed at predetermined points through adjustable dogs spaced as desired along the stop bar. As the apron contacts with these dogs a clutch in the feeding mechanism is disengaged, stopping the carriage instantly. When the pressure of the apron against the stop dog is removed, the feed clutch automatically reengages and and the carriage is ready to move on to the next stop. The advantage of the automatic stop mechanism is eliminating delay due to work measurement, and thus permitting the lathe to cut metal more minutes per hour.

An arrangement is provided for convenient and accurate setting of the stop dogs along the bar. By throwing the bar control lever at the tailstock end of the bed 180 deg., the stop bar is moved endwise against a positive stop and the feed clutch automatically held in its disengaged position, while the stop dogs are located by means of a gage or scale measurement.

In addition to the stop dogs a templet bar may be furnished, which may be permanently notched to correspond to the work shoulders, and used in the place of stops for tripping the carriage feed.

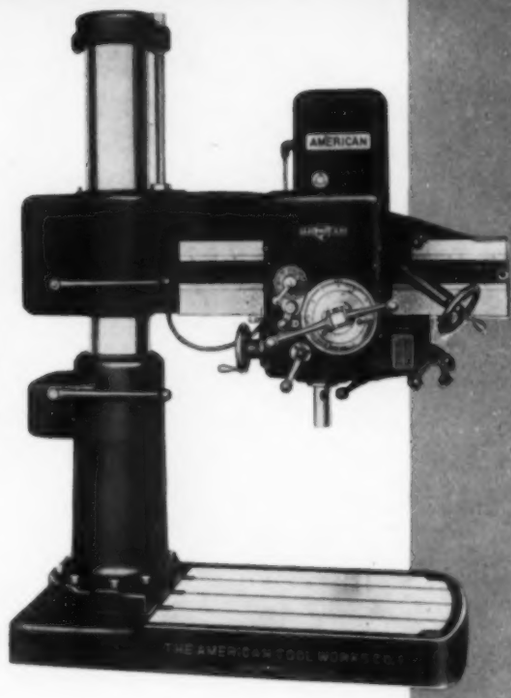
Positive-diameter stops are hand operated and determine the limit of the cross feed for each diameter. This mechanism consists of a slotted cylinder at the right-hand side and paralleling the carriage bridge, with a star knob for operating. Five slots, each with an adjustable dog, are supplied around the cylinder, providing for five different work diameters. The collar numbered from 1 to 5 is carried by the operating star knob to

Direct-reading cross feed dials have very legible graduations, eliminate calculations by the operator by providing direct reading for diameter reduction



assist the operator in identifying the correct stop set-up for each diameter. Between each stop position is a neutral point, shown on the star knob dial by the letter N, indicating a point to which the toolrests will pass over the stop dogs without interference.

Dual direct-reading cross feed dials, which are large in diameter, providing plenty of space for legible graduations, are geared to the cross-feed screw to provide direct reading for diameter reductions. One complete revolution of the dials indicates a 1-in. reduction of the work, while a fractional setting, for example ¼ in., or a decimal setting, will produce a reduction of the exact amount.



Eighteen spindle speeds range from 35 to 1,500 r.p.m. Six rates of power feed are afforded by a sliding gear feed unit

Holewizard Radial Drill

Higher speeds, less operating effort and minimized maintenance are the purpose of the super-speed "Holewizard" radial drill. Equipped with a 5-hp. built-in motor, the economical drilling capacity of this machine is approximately 2 in. diameter in cast iron and 1½ in. in steel. The corresponding tapping capacities are 2 and 1½ in. respectively. Eighteen spindle speeds in geometrical progression cover a standard range of 35 to 1,500 r.p.m. By use of pick-off gears this range may be changed. The spindle reverse required for tapping is accomplished by means of an almost instantaneously reversing motor.

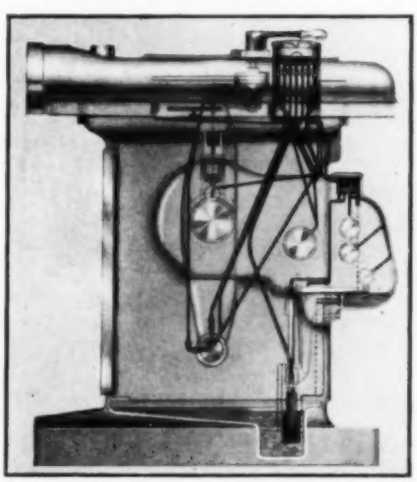
The head is mounted on roller bearings. Traverse along the arm is accomplished manually. All speed changing mechanism is located within the head casting, as is also the spindle feed unit.

Drive to the spindle is through hardened and lapped helical gears at the bottom of the head, minimizing the torsional or twisting effect upon the spindle. Six rates of geared power feed are produced by a sliding gear feed unit in which the gears are anti-friction mounted. All feeds are direct-reading. Connection between the feeding unit and the spindle is a band-type friction which protects the entire transmission against accidental overloading. An improved automatic trip for the feed operates up to 12 in. at one setting. A safety stop is provided for tripping the feed.

This machine is built only in the motor-driven type. Start, stop and reverse of the motor is secured through a reversing drum controller, operated by a lever. Power elevating and lowering is done by a ¾-hp. motor and reversing drum, built into the unit and connected to the revolving elevating nut. A directional control lever operates the elevating unit and also automatically clamps and unclamps the arm in unison with the elevating mechanism.

A plain box table provides two large working surfaces, one horizontal and one vertical, both having T-slots. A universal table is used for angular work setting. It consists of a standard base, on which is mounted a tilting work table of two surfaces.

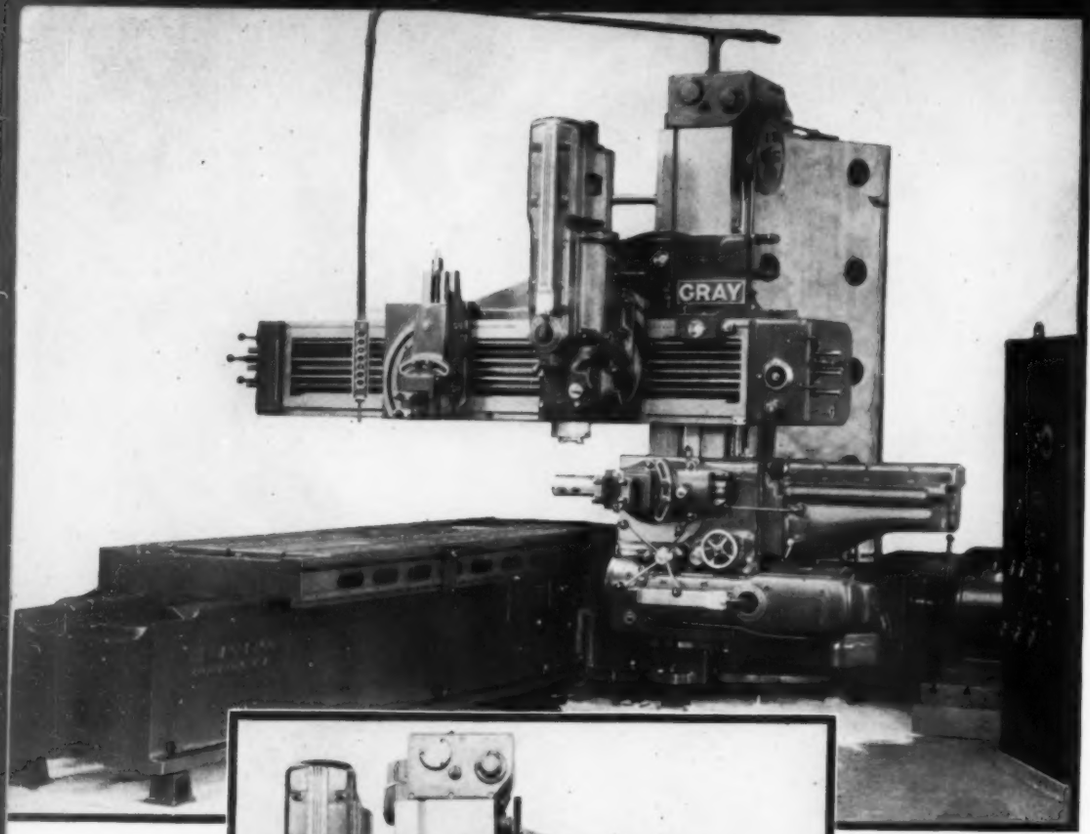
Filtered oil is supplied to all moving parts of the "Auto-Oiled" shaper



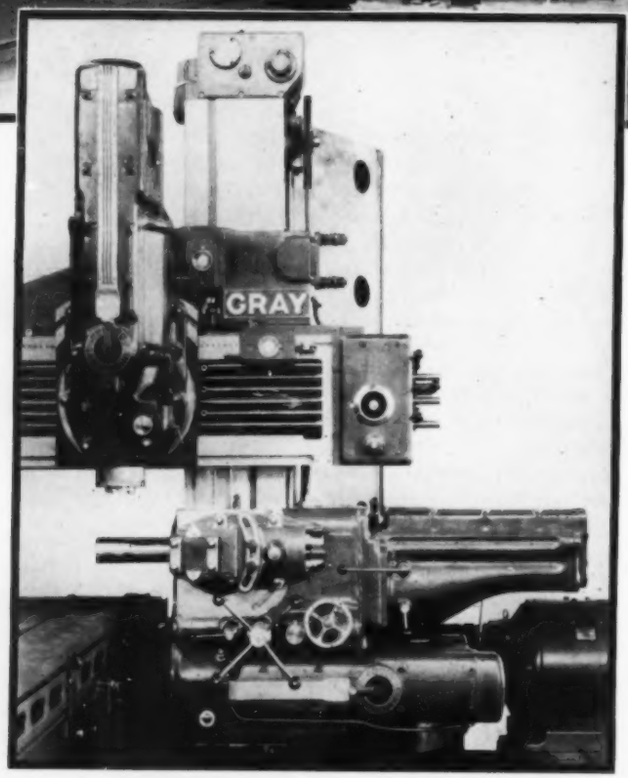
Improved "Auto-Oiled" Shaper

The "Auto-Oiled" 16- and 36- in. shaper, announced by the American Tool Works Co., Cincinnati, Ohio, will cut 0.60 carbon die-block steel at the rate of 8.2 cu.in., or 2½ lb. per min. It will use full capacity of a 15-hp. motor. A gearbox provides four changes of speed which combined with the back-gear produces a total of eight cutting speeds for the ram.

All moving parts are constantly flooded with filtered oil in such volume as to carry away bearing heat and foreign matter. The oiling system consists of a large oil reservoir in the base, under the column, with a settling compartment where the sediment is deposited. From a second compartment into which the settled oil flows, a plunger pump forces the oil through an all-metal oil filter into a distributing tank at the top of the column. The control system is centralized; the operator does not have to move from his operating position to start or stop the machine, to change speed, to engage or disengage back gears or the feed.



Planing, milling, boring and drilling can be done without changing the setting of the work. Both openside and double-housing types are built with any number and combination of milling and planing heads



Gray Milling Planer

Combining the speed of a milling machine with the accuracy and simplicity of tooling of a planer, the milling planer, announced by the G. A. Gray Co., 3611 Woodburn Ave., Cincinnati, Ohio, is a tool of great flexibility and general adaptability. Without changing the setting of the job, planing, milling, boring or drilling may be done. When equipped with duplex tables, a job can be set up on one section of the table while machining another job on the other, or both tables can be used at one time for extra long work. This milling planer is built both in the open-side and double-housing types with any number and combination of milling and planing heads.

The table slides on V-s in the bed and is always rigidly supported, as it never overhangs the bed, the bed being twice the length of the table. Side thrust bearings and steel hold-down gibs are provided. Provision is made for quickly clamping the table solidly to the bed when accurate boring, drilling or cross milling is being done. Drive to the table is by a balanced helical gear drive.

The rail is of exceptionally wide face and embodies the narrow guide and slide design to obviate cocking of the head when cross milling. Weight of the rail milling head is carried by spring-loaded anti-friction rollers which relieve guideways of all weight. Milling heads are individual units, each driven by its own motor. On some kinds of work the heads may carry different size cutters and it is of advantage to have each running at its proper speed. If the head is not in use its parts are at rest. The milling heads are built in sizes ranging from 7½ to 50 hp. Spindle motors are of the a.c. two-speed type, mounted concentric with the spindle and transmit the power directly to the spindle through planetary gearing. Eighteen single speeds in geometric progression ranging from 10 to 500 r.p.m. are afforded by this gearing. The speeds are changed at the head itself by simply turning a crank, and an arrow on a direct-reading dial shows the speed for which the head is set. Direction of rotation of any spindle can be changed by throwing a switch on the control panel. Rail milling heads may be furnished either swivelling or non-swivelling, making it possible to bore, drill or mill at an angle without tilting up the work or using special cutters.

MACHINE TOOL SHOW

Either planing side heads or milling heads or combination planing and milling side heads can be furnished. The milling side heads or combination heads may be either of the quill or bar type. On the quill-type side head, the motor is mounted below and parallel to the spindle instead of in line with it, as in the case of the rail-spindle head. The quill-type side head regularly affords 10 in. axial spindle feed and has 18 changes of speed. the bar-type side head is similar to the quill-type, except that the spindle is a nitralloy bar slidably mounted in nitralloy bushings, which in turn are mounted in precision anti-friction bearings. The length of axial bar feed is usually 24 or 30 in., but can be made to suit individual requirements.

The standard milling feeds for the table, rail heads and side heads are from 1 to 60 in. per min. Standard range of power down feed and up feed of rail heads is ¼ to 15 in., and in-and-out feeds to side heads are from ⅛ to 7½ in. In addition to feeds for table and heads all have power rapid traverse in any direction. Feed or rapid traverse of any head can be engaged or disengaged without affecting the feed or rapid traverse of other heads.

Table and heads must be set with great precision when boring and drilling exacting work, such as jigs and fixtures. This can be accomplished practically automatically and with maximum speed and accuracy when the planer is equipped with the Gray high-speed precision setting device. This device is built into the machine and must be ordered with it as it cannot be added later. It makes possible the production of interchangeable work without the use of large jigs or fixtures. Accuracy of setting is shown on a dial indicator graduated to one-half thousandth of an inch.

When the machine is functioning as a planer, the table can be jogged in either direction or started automatically in either direction from the pendant station. The tumbler has been replaced by switches that operate as reversing switches when planing and as feed-limit switches when milling.

Safety devices are provided for all of the feed and power traverse mechanism. It is impossible to throw in the automatic feed of the table or head when the cutter is not running. It is also impossible to stall the cutter in the work as the feed is automatically thrown out before the spindle motor is seriously overloaded.

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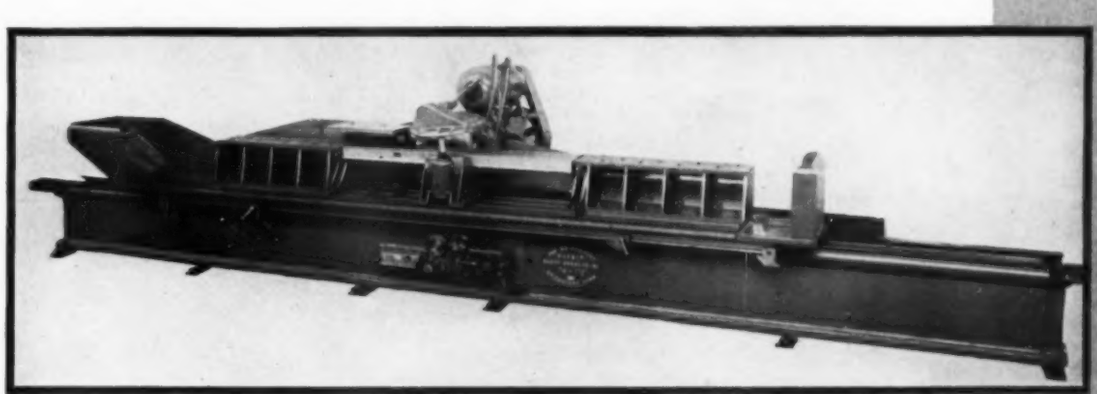
Bridgeport No. 75 Shear Blade Grinder

Accurate grinding of flat surfaces, either by holding the work to the table in a special fixture, or on magnetic chucks, is the function of the No. 75 grinder, announced by the Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn. The center section is a double-face, center-controlled, revolving magnetic chuck for holding flying shears and other knives with bevel edges. For grinding long squaring shears the revolving bar is lined up with the angle bar sections on the ends of the table.

Table ways are equipped with a squirt feed lubricating system which provides lubrication from an oil reservoir in the bed by means of a double-acting pump, to the bearing as well as the way. A Purolator cleans the oil after it is returned to the reservoir.

An oilgear hydraulic pump and motor provide a means of driving the carriage at any desired speed up to 90 ft. per min. A Bridgeport sectional wheel mounted in a steel chuck is used. The dresser is mounted on the wheel guard. Movement of the wheel to the work is also controlled by the hydraulic unit. A direct-connected centrifugal pump provides coolant to the wheel and work through two nozzles. A hose is also attached to the supply line for cleansing the face of the chuck.



Any desired speed for the carriage up to 90 ft. per min. is obtained through the hydraulic operating mechanism

No. 1 tool and cutter grinder which swings 10 in., and can be operated from the front or rear

Norton Tool Grinders, Surface Grinder and Lapping Machine

Several improvements have been made in the No. 1 universal tool and cutter grinder as follows: heavier base and saddle ways, larger handwheels and relocation of the lever for operation of the table. This machine can be operated from either the front or the rear, the cross feed being provided with a handwheel at both points and graduated in thousands. Swing of this machine is 10 in. A table operating lever and a handwheel at the front are provided for traversing the table. This handwheel can be used at either side or in corresponding positions at the rear of the saddle. The same applies to the table operating lever. This machine, and the other three in this article, are built by the Norton Company, Worcester, Mass.

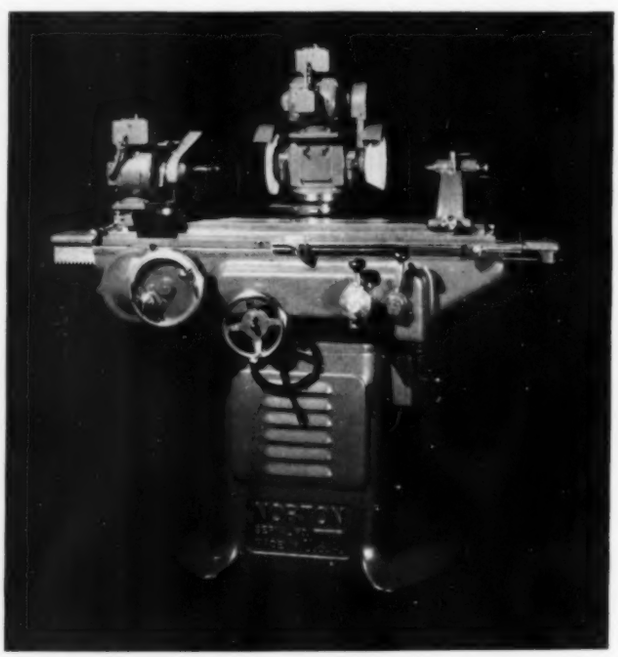
Hydraulic table traverse for cylindrical or internal grinding, and in some cases the grinding of cutters, is a feature of the No. 2 universal tool and cutter grinder. Attachments available include: universal workhead, combination attachment, universal vise, internal grinding attachment and other accessories. Aluminum castings make these units light in weight for easy removal when changing jobs. Swing is 12 in.

A handwheel at the front as well as at the rear permits operating the saddle from both positions. An apron at the front permits moving the table by hand.

The wheel spindle is V-belt driven from a motor mounted directly above the wheelhead on a post which carries the spindle. The wheelhead can be raised and lowered by means of an elevating hand-wheel graduated in thousandths. Milling cutters with National Standard tapered shanks or No. 12, 10, 9 and 7 B & S tapers can be accommodated by the universal workhead. When equipped with a motor-drive arrangement the unit becomes a headstock for driving cylindrical work, and when equipped with the three-jaw universal chuck or the face chuck permits the grinding of internal work or the sides of thin cutters and saws.

When the machine is devoted exclusively to cutter grinding it can be equipped with a left-hand footstock which, with the standard footstock provides for the grinding of cutters mounted on centers. Both the left-hand footstock and the universal workhead are graduated for setting clearance angles when backing off cutter teeth. Universal workhead has two sets of graduations by means of which the work spindle can be swiveled at any angle.

Another toolroom machine, the 6x18-in. surface grinder, has an hydraulic automatic cross feed instead of a mechanical type previously used. In addition a different oil pump and motor suspension is employed. Formerly, an integral motor and pump were used and it was mounted on the inside of the front cover. In the illustrated machine, however, a standard frame motor is direct connected to the pump. Both units are mounted on a bracket suspended by springs in the upper part



No. 2 universal tool and cutter grinder which has hydraulic traverse and swings 12 in.

MACHINE TOOL SHOW

of the interior of the base. This mounting eliminates vibration.

Wheel spindle bearings are considerably larger and are lubricated by oil rings which carry lubricant to the spindle from a reservoir in the carriage. The spindle flange now runs between two bronze thrust plates. End thrust adjustment is made without removing the spindle cartridge from its housing by taking off the wheel collet which exposes the adjustment.

Improved Lapping Machine

Considerable improvement has been made in the No. 10-U lapping machine. This machine is equipped with two cast-iron laps, the lower one revolving, and the upper one being free to float and adjust itself to irregularities in the work pieces. These laps run at different speeds. The upper lap is elevated by rack and opinion. The overarm is clamped by a binder handle conveniently placed in front of the operators. The lower lap is carried by a spider mounted on a hollow spindle and driven by worm gearing.

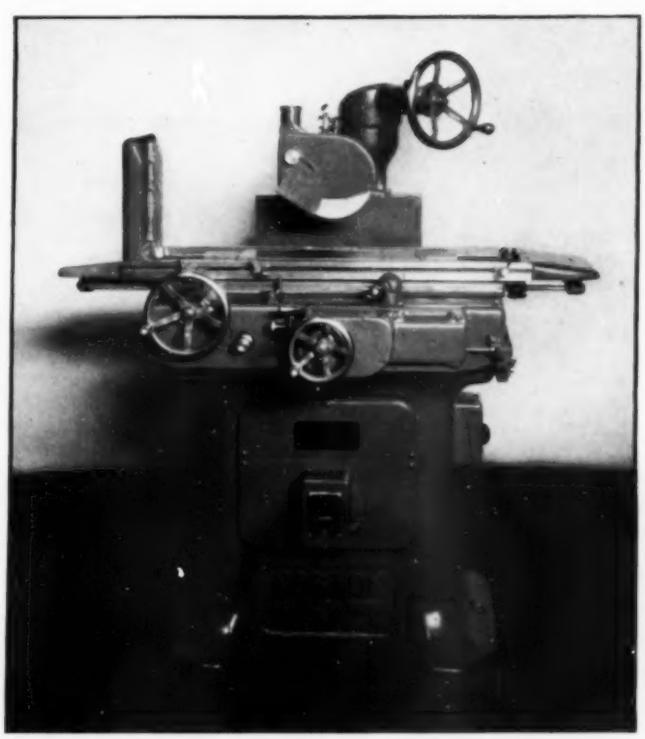
Two speeds of the lower lap and work are provided, the machine being driven by a motor mounted on a pendulum-like platform (to maintain belt tension) within the base. A convenient lever operates the switch which controls the motor and brake.

When flat lapping three pins carried by sub-heads on the work-holder driving mechanism rotate about each sub-head axis and also about the spindle and lower lap axis. The work pieces lie in adapters which are rotated between a disk driven by the three pins and a split ring around the outer diameter of the lap. This ring is free to oscillate between the lap faces but cannot rotate. The result of this arrangement is that the work pieces are caused to move about between the lap faces with a compound, planetary motion in an ever-varying path, thus breaking up the line of travel.

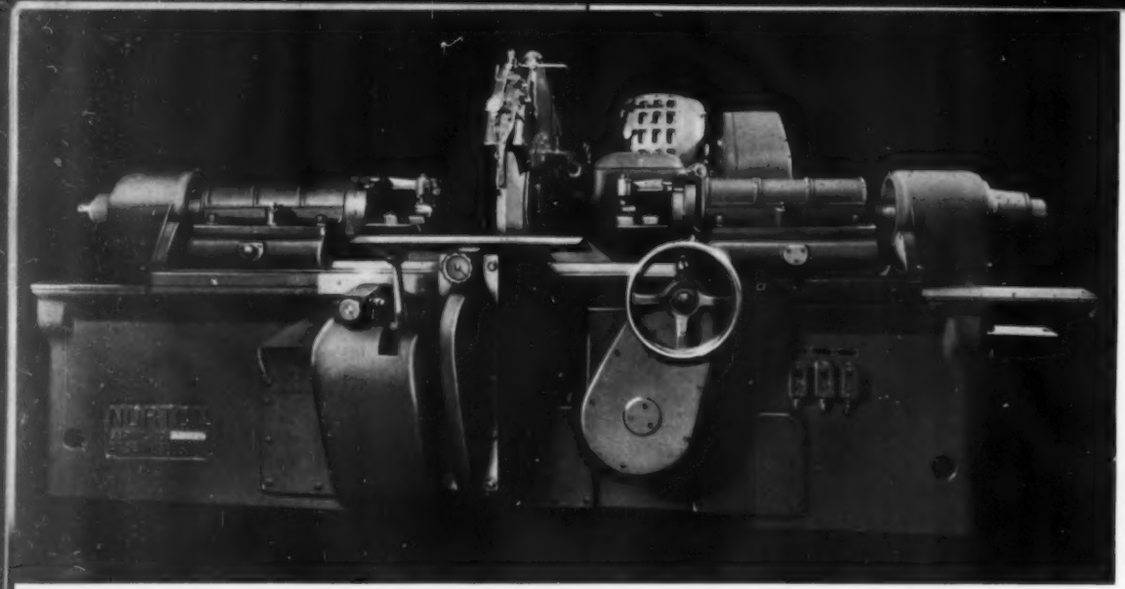
Cylindrical pieces are lapped by employing a work holder in which the work pieces lie not radially but with their axes tangent to a small circle at the center. A single driving pin set off-center imparts an eccentric motion. In both flat and cylindrical lapping the eccentricity of the driving pin or pins is adjustable from 0 to ¾ in. Upper and lower laps are interchangeable to permit reversing them periodically to maintain flat faces on both laps.

Specifications: Capacity, flat work, thickness 3 in., length 4 in.; weight of the machine 1,000 lb.

Flat or cylindrical work can be lapped on the No. 10-U machine. Line of travel of the work follows a varying path



Hydraulic automatic cross feed is now used on the 6x18 in. toolroom surface grinder



The Type D-86 grinder for crankpins requires only two levers and one handwheel for operation. This machine is a double-head type and the workheads can be synchronized

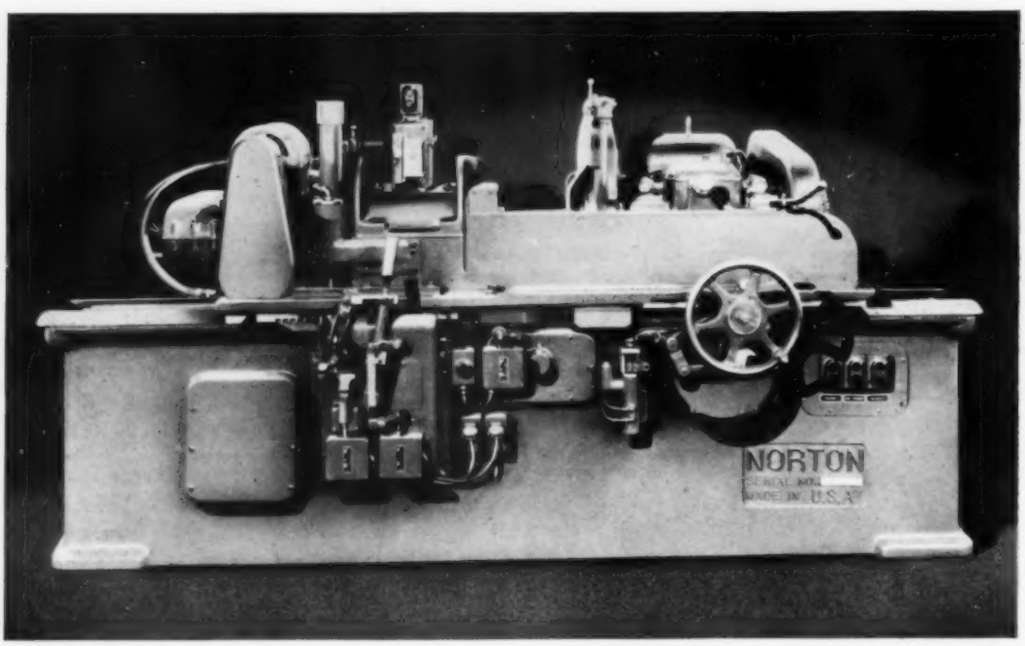
Norton Crankpin and Camshaft Grinders and Production Lapping Machine

In addition to the four machines described on the preceding two pages, the Norton Co., Worcester, Mass., is offering three other machines, as shown herewith. The D-86 crankpin grinder for automotive crankshafts requires but two levers and one handwheel for operation. One lever controls the work rotation, the opening and the closing of the workholders, the rapid and slow traverse of the wheel unit up to or away from the work and the rapid movement of the table from one pin to another. The second lever is used for "jogging" of the table to bring the pin being ground in line, and the handwheel is used to feed the grinding wheel into the work, size being obtained by a gage.

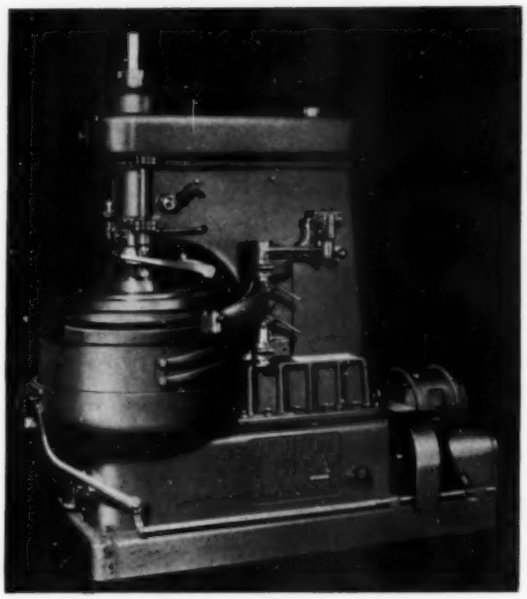
Another feature is the "Lo-Rest," an hydraulically operated steadyrest that drops down clear of the work automatically when moving from one pin to the next. This feature facilitates loading, since the rest is clear of the shaft, allowing the operator unusual freedom in handling it.

The machine is a double-head type with work-head spindles 6¼ in. in diameter by 29 in. in length, and the upper bearing is of a full half cap. Workholders can be stopped automatically in the loading position. As in earlier models the controls are interlocked, making it impossible for the operator to move the table by power; for example, while the work is rotating or the wheel unit is at the inner position. In addition, the workholders cannot be opened while rotating.

Standard frame motors are employed, one for driving the wheel unit and this is mounted directly on the wheel-slide. Another drives the coolant and oil pumps, the latter for operating the hydraulic mechanisms. A third motor drives the work by means of V-belts through a clutch; thence



"Cam-O-Matic" for automatically grinding all the cam contours on automotive camshafts. Work speeds of 12 to 75 r.p.m. permit either rough or finish grinding



Pressure on the work in the "Hyprolap" machine is obtained by hydraulic cylinders

by a silent chain to a drive shaft under and running the full length of the table. From this shaft, silent chains drive each of the workhead spindles. Adjustments for synchronizing the workheads are provided.

The "Cam-O-Matic" grinder automatically and successively grinds each cam on a camshaft, trues the grinding wheel, and stops for reloading. All the operator does is load the machine, press a push button and move one lever which starts the functioning of the automatic cycle. This causes the rocking bar to lower, bringing the master cam in contact with the master cam roller, starting the work rotating, and feeding the grinding wheel in rapidly until it contacts the work when it slows down to a grinding feed. A timing unit causes each cam to make exactly the same number of revolutions in contact with the wheel and the latter to leave the work upon completion of grinding at the nose of the cam. A work-drive unit provides a speed range of from 12 to 75 r.p.m., which is suitable for either roughing or finishing.

The machine is electrically controlled and hydraulically operated. Upon completion of the predetermined number of revolutions in contact with the wheel, a limit switch is operated which in turn energizes a solenoid that operates the wheel-slide control valve. This causes the grinding wheel to recede rapidly from the work and other valves to be operated which lift the rocking bar and cause the table to move quickly to the next cam. After this the rocking bar lowers again with the correct master cam in contact with the master cam roller, and the grinding wheel again moves in rapidly until contact is made. In sizing, the grinding wheel always feeds into a positive stop, thus assuring duplication of performance for each cam on the shaft. Reciprocation of the wheel during grinding is another feature, but this stops automatically while the grinding wheel is being trued.

The "Hyprolap" machine is hydraulically operated and designed for high-production lapping of flat work up to 6 in. across its longest dimension, or cylindrical work up to 6 in. in length. Bonded abrasive laps 24 in. in diameter are employed. Both laps rotate, but in opposite directions and at different speeds. The work is caused to travel in a circular path between the two laps.

Two hydraulic cylinders, one on each side of the upper lap spindle, raise and lower the upper lap and also are utilized to provide pressure to the work during lapping. This upper lap spindle is counterweighted so that the pressure being applied hydraulically is the actual pressure on the work. Drive is by V-belt through a clutch and brake.

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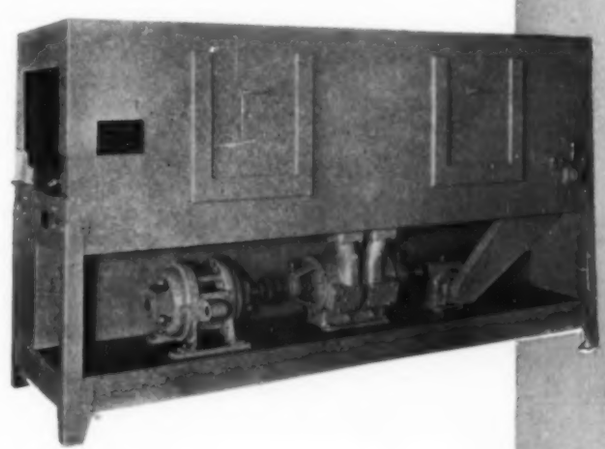
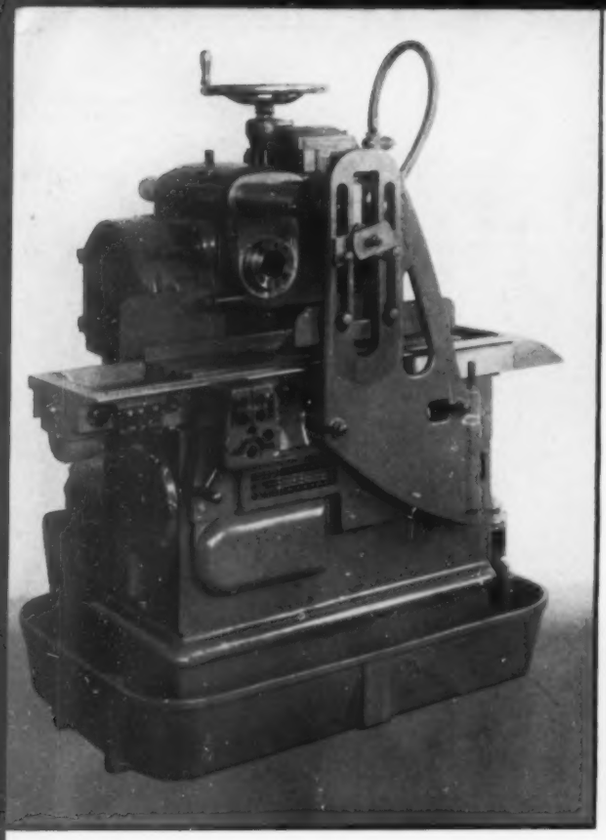
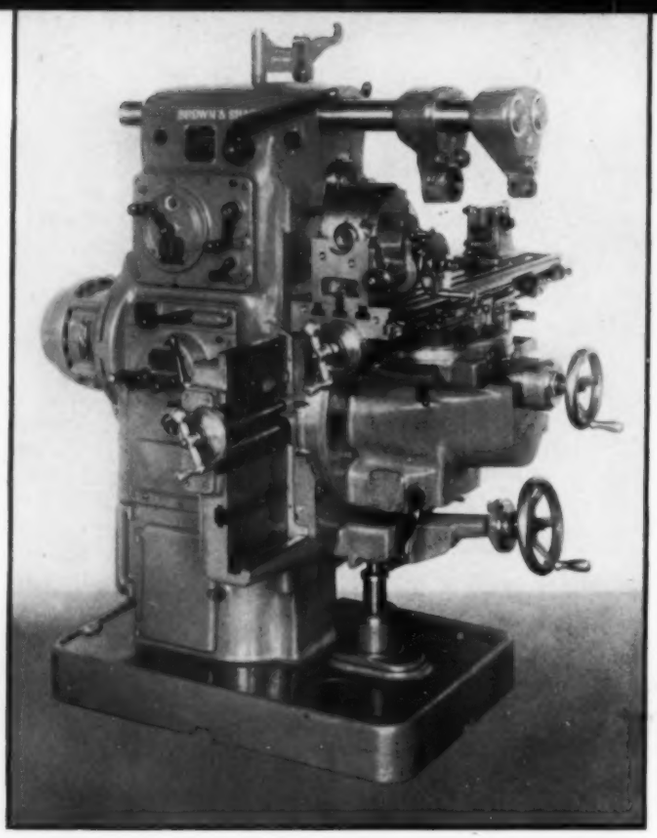
"Autosan" Cleaning Machine

The Model MR-8, one of the "Autosan" units developed by the Colt's Patent Fire Arms Manufacturing Co., Hartford, Conn., is a standard washing and rinsing unit designed to clean a wide variety of parts. Parts are placed on a wire-mesh conveyor and automatically carried through the washing and rinsing sprays.

This model is equipped with two outside or extended tanks having perforated scrap trays which are easily removed for emptying. Twelve spray tubes are provided, three above and three below in both the wash and rinse chambers. All tubes are easily removed for cleaning without the use of tools. The MR-8 may be furnished with several types of conveyors, depending on the type of work to be washed.







Left—No. 12 plain miller operated by electrical controls and intended for moderate or long runs on medium-size parts, particularly form milling in steel. Right — No. 0 "Omniversal" designed primarily for toolroom and experimental laboratory use, but suitable for short runs where it eliminates fixture expense

Brown & Sharpe Milling Machines and Surface Grinder

Electrical and hydraulic controls are freely used in the milling machines and grinders developed by the Brown & Sharpe Mfg. Co., Providence, R. I. The No. 12 plain milling machine is operated through electrical control rather than by mechanical tripping. An automatic backlash eliminator makes it possible to rotate the cutters in the same direction as the feed (climb milling) or in the conventional method (rotating against the feed). Two rates of cutting feed are available for any one selected feed rate, either one-half the selected feed or double the selected feed. This feature is operated by a trip dog which can be set at any desired point. The machine will reverse in cutting feed, making it possible upon some work to rough and finish mill in the one clamping of the work piece.

The No. 12 machine is a compact production type for duplication of medium-size parts, either in moderate or long runs. It is particularly adapted to form cutter milling in steel although it is equally applicable for any type of production drilling.

Attention has been given to convenience in setting up. All adjustments can be made from the front of the machine. The outer brace swings on a hinge for cutter removal or for setting trip dogs.

This No. 5 hydraulic surface grinder is suitable for toolroom and manufacturing use

MACHINE TOOL SHOW

Four push buttons control the electric functions of the machine, governing all table movements in either direction, or automatic control is provided through trip dogs engaging switch contacts. The tripping mechanism is accurate and will duplicate in power fast travel within less than $\frac{3}{4}$ in., and in cutting feed within 0.002 in.

Capacity of the machine is as follows: Automatic longitudinal table travel, 18 in. (24 in. can be supplied); vertical adjustment of spindle, $7\frac{1}{2}$ in.; transverse adjustment of spindle, $3\frac{1}{4}$ in.; speed range, 18 changes, 40 to 1,050 r.p.m.; feed range 16 changes, 1 to 35 in. per rev.

The No. 0 "Omniversal" milling machine is designed primarily for toolroom and experimental laboratory use. It is valuable, also, however, for manufacturing departments whose work is on short runs that would not justify fixture expense. The machine provides an easy and accurate method of obtaining simple and compound angular settings for milling and boring operations. Angular settings may be made to 2 min. of arc.

The machine is suitable for milling operations on flat form tools since clearance angles are obtained readily. A universal milling attachment with crane provides an auxiliary spindle. Capacity of the machine is as follows: Longitudinal feed: table, 17 in., automatic; knee saddle, 17 in., automatic; combined longitudinal feed, table in horizontal position, 34 in., automatic; transverse feed, 6 in., hand; vertical feed, $10\frac{3}{8}$ in., hand. Centers swing 10 in. in diameter, and take $14\frac{1}{2}$ in. in length.

The No. 5 hydraulic surface grinder is suitable for toolroom and manufacturing use. Rigid support has been given to the table to secure maintenance of accuracy. In addition, the wheel spindle is carried in a vertical slide of unusual width and length.

The spindle unit is of the cartridge type. The table is hydraulically operated, providing any desired longitudinal feed up to 60 ft. per min., and any desired rate of automatic transverse feed up to 0.15 in. per reversal of longitudinal travel.

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Universal Horizontal Boring Machine

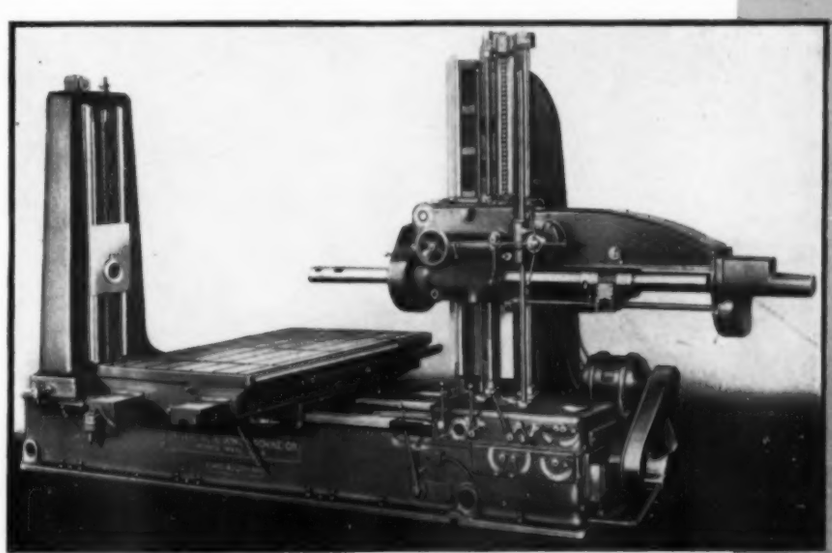
Two models are now being built in the "400 Series" boring machines announced by the Universal Boring Machine Co., Hudson, Mass. The No. 440 machine has a 4-in. main spindle, and the No. 450, illustrated, machine has a 5-in. spindle.

The 5-in. machine has a range of spindle speeds of 8 to 300 r.p.m. in the low range and of 7 to 850 r.p.m. in the high range. The number of non-overlapping spindle speeds is 24. Traverse of the spindle with one resetting is 72 in., and the maximum distance from faceplate to outer support is 84 in. Distance from the top of the table to the center of the spindle is 48 in., and the working surface of the table is 36x72 in. Power cross feed of the table is 60 in.

The No. 440 machine is approximately the same size but it may be equipped with a high-speed range of 8.3 to 1,000 r.p.m. Both machines may be equipped with extra wide and extra long tables, extra high columns and extra long beds.

These machines have been designed to meet the increasing demand for faster, more powerful and more accurate horizontal boring machines. The high spindle speed range available to the main spindle provides a range of speed suitable for small drilling, milling and boring operations, and for the application of cemented-carbide tools. By securing this speed range in the main spindle the full speed of the spindle is made available at any spindle speed.

Nitralloy steel, hardened, ground and lapped is used for the main spindle and for the front end portion of the spindle sleeve. The main spindle sleeve is mounted in zero-precision adjustable Timken roller bearings. Other features include simplified clamping, improved gib adjustment, a one-shot oiling system and a power-driven oil circulating system for the gearbox and head.



For heavy work a 20-hp. motor may be applied to the Nos. 440 or 450 machines

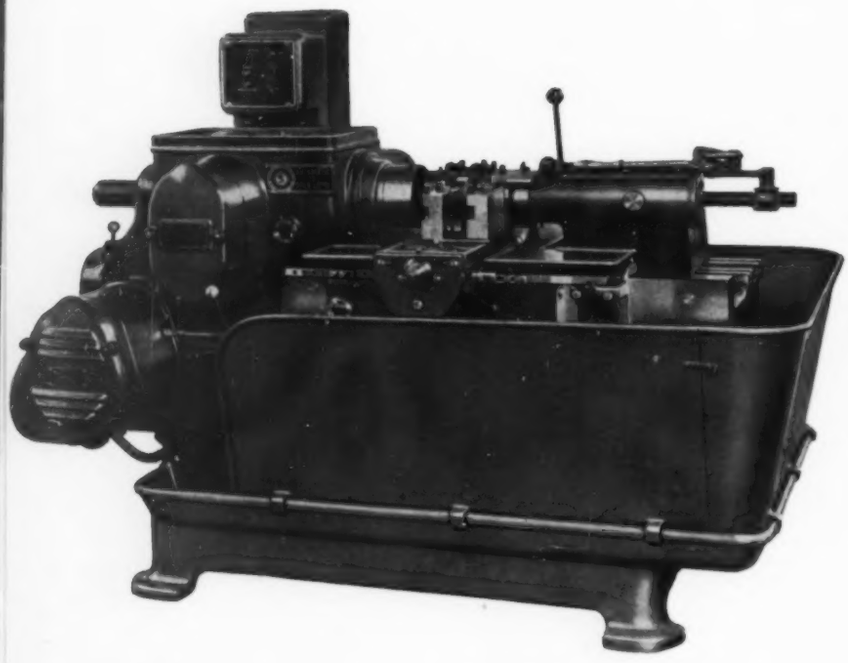
Sundstrand Stub Lathe, Milling Machine and Hydraulic Drilling Unit

Another size of automatic stub lathe has been added to its line by the Sundstrand Machine Tool Co., Rockford, Ill. This 10-in. machine has an automatic cycle which includes rapid approach, feed into depth, turn, face, tool relief if desired, quick return and stop. By the simple adjustment of a dog, the cycle can be arranged to repeat itself when automatic work-handling attachments are employed. Four groups of spindle speeds are available: Model A, 38 to 400 r.p.m. Model B, 57 to 600 r.p.m.; Model C, 114 to 1,200 r.p.m.; Model D, 171 to 1,800 r.p.m. Any of these machines can be obtained in the following standard lengths between centers: 16, 22, 34, and 46 in.

Speeds, feeds and carriage movements can be adjusted in a few minutes to meet the requirements of the wide variety of work pieces within the capacity of the machine. Two large taper roller bearings are used at the front end and one ball bearing at the rear of the spindle, but bronze bearings can be had at the front-end of the spindle on A and B models, on special order.

The front tool-slide has micrometer adjustment. The front carriage may have an automatic feed-in attachment and an automatic tool release. All moving parts of the front carriage units, including cross-slide, have automatic pressure lubrication. Control of the operating cycle is secured through dogs placed on a disk which has widely spaced graduations, each representing $\frac{1}{8}$ in. of front-carriage travel.

The outer end of the spindle is threaded for application of cylinders for actuating work-holding devices. A five-button station provides complete manual control of motors for main drive, rapid traverse and coolant pump. The rear carriage is manually adjustable along the bed. Automatic high-speed traverses are driven by separate standard-type reversible motor which has adjustable electric brake and a governor-controlled lock.



Sundstrand's latest stub lathe is a new size and in many respects a new type

No. 2 Automatic "Electromil"

High-speed milling on parts of business machines, household appliances, electrical apparatus, firearms, small machines, tools and the like can be done on the No. 2 automatic "Electromil." This machine has automatic electric table control and is designed to use extremely simple fixtures. It is said that the machine can be used most effectively to secure low-cost production on parts manufactured in small quantities.

Among the features of the No. 2 machine are its nimbleness of table-movement and general adaptability. These are secured from the electrical system of table control. This function is divided between a waterproof control box on the front of the machine, which is actuated by adjustable dogs on the table, and a panel in a compartment at the rear of the machine.

The table control employs light-weight electrical contacts. Flexibility is such as to give any combination of table cycles within the capacity of the machine. Table feeds can be varied by changing pick-off gears or by means of an 8-speed quick-change gearbox. Any one of three ranges of table feed can be secured.

The spindle head is available in three types—low-speed, medium-speed and high-speed. Any of these speed ranges can have pick-off gears for changing the spindle speeds, or an 8-speed quick-change gearbox. Rotation of spindle can be continuous in one direction, or can have an automatic stop or reverse.

The machine table is 12 in. wide, 35 in. from the floor line and may have either 18 or 24 in. of power feed. Distance from the center of the spindle to the top of the table is $3\frac{1}{4}$ in. minimum, 12 in. maximum. A total of 36 feeds through pick-off gears are available, ranging from $\frac{1}{2}$ to 80 in. per min. With a quick-change feedbox a total of 24 feeds are available, ranging from $\frac{3}{4}$ to

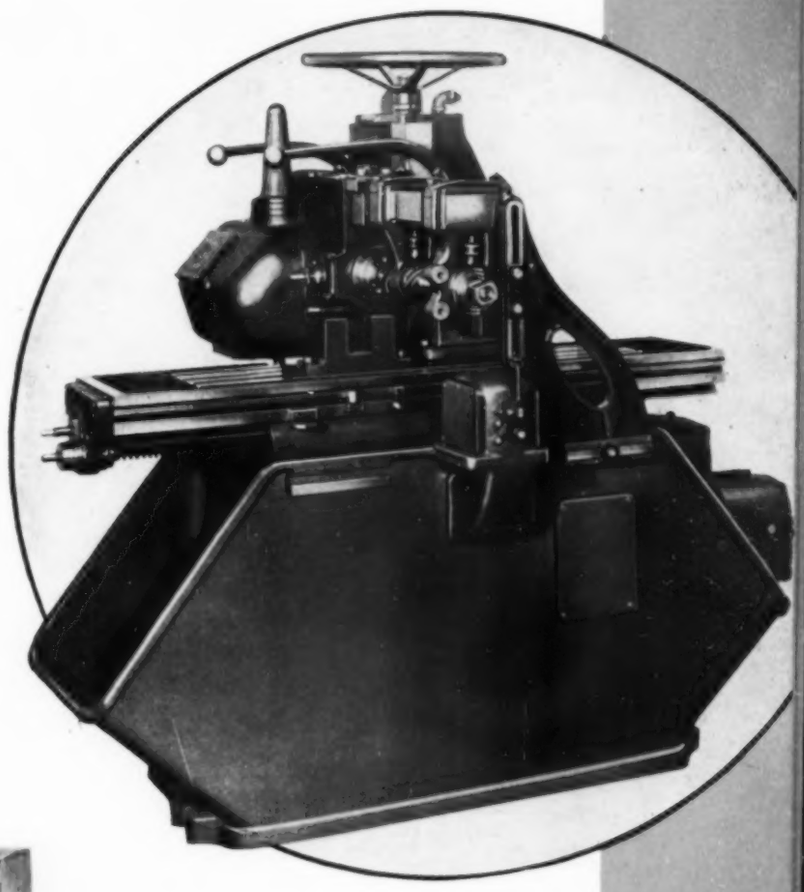
48 in. per min. A total of 18 spindle speeds through pick-off is available, ranging from 41 to 1,825 r.p.m. With quick-change spindle heads a total of 24 spindle speeds ranges from 42 to 1,286 r.p.m.

The spindle head is locked securely in position by means of a quick-acting clamp. In the pick-off gear type six sets of gears are provided for standard spindle speed and feed rates.

Coolant is supplied by an independently driven impeller pump. Micrometer dials give accurate adjustment of table, quill and spindle head while table ways and operating mechanism have automatic forced feed lubrication. Standard electrical equipment is used wherever possible.

Sundstrand Hydraulic Drill Unit

A sliding-head hydraulic unit suitable for boring, drilling, reaming and spot facing, milling and similar operations is illustrated. This unit is built in 7½-, 10-, 15- and 20-hp. standard sizes. It has a base or slide on which is mounted a head with direct-connected motor drive. Drive for rotating the spindle is by mechanical means through a special floating coupling and a pair of pick-off gears. Spindle speed can be changed by transposing the pick-off gears or substituting others having a different ratio.



Above—Automatic electric table control is built into the No. 2 Electromil, a small edition of the widely known Rigidmil. Left—Entire range of spindle speeds of the hydraulic sliding-head drill unit can be altered by changing gears which are covered by a removable plate at the front of the head

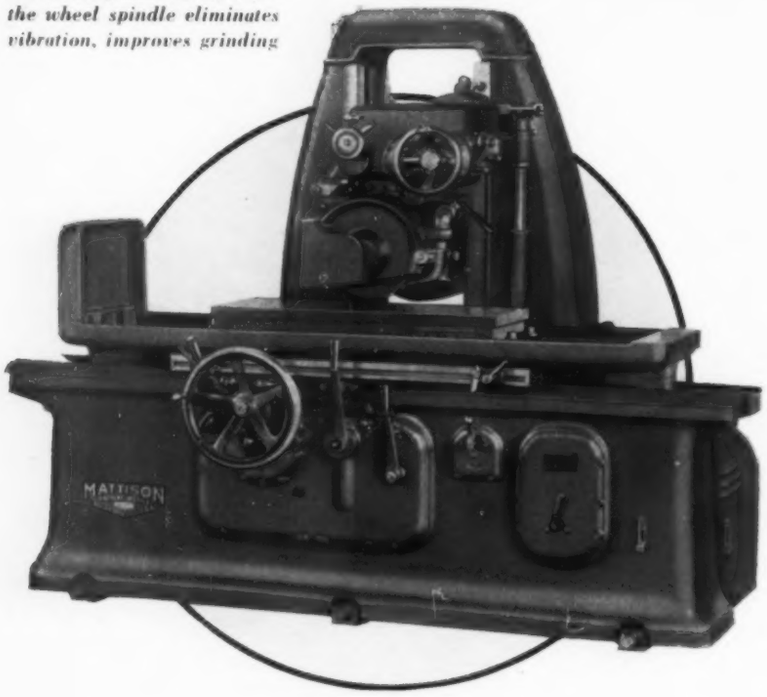
The automatic operating cycle of this unit includes rapid approach to the work, feed, a slower feed and dwell, or dwell only as desired, rapid return and stop. Both feed rates are adjustable throughout their entire range by the manipulation of two conveniently placed knobs. Operation of the feed and rapid traverse sequence is controlled by adjustable dogs, and may include rapid traverse between intermittent cuts. Hydraulic power for feeding is provided by a variable-displacement, multi-piston pump, and for rapid traversing by a "Rota-Roll" constant-displacement pump. Both of these pumps are contained in a single housing.

The drill units are readily adaptable to a wide variety of uses, singly or in multiple, and may be operated individually by manual or remote control, or simultaneously by remote control where desired.

The solid spindle nose is provided with keyway. Front end of the head is machined accurately and flanged for attachments of multiple spindle heads. All shafts are mounted in anti-friction bearings and run in oil.

In the 5-hp. size the head travels 14 in., standard spindle speeds range from 170 to 900 r.p.m., and any desired feed from ⅜ in. to 40 in. per min. may be secured. Rapid approach rate is 280 in. per min; rapid return, 370 in. per min.

Motor-on-spindle design for the wheel spindle eliminates vibration, improves grinding



Mattison Surface Grinders

Developed originally in 1930 and 1931, the 12- and 14-in. precision hydraulic surface grinders built by Mattison Machine Works, Rockford, Ill., were put through several years of tests in the factory of the manufacturer and also in two or three customer plants before the machine was introduced to the public. For the Machine Tool Show the original machine has been improved by many minor refinements and by several more important ones that deserve mention.

For controlling the up and down travel of the entire wheel-slide, a hoist motor with a sensitive switch for controlling it has been added. In addition, the whole top mechanism has been closed in under a cover for protection.

The rotor of the wheel-spindle motor is mounted directly on the wheel spindle, and the whole spindle is then balanced as a unit. The wheel spindle itself is mounted in a heavy housing carried on horizontal ways and this assembly in turn is supported between a vertical column having taper-gibbed ways.

Longitudinal table travel is hydraulically operated by two cylinders which provide uniform speed in either direction. The stroke is adjustable to cover any portion of the table by a setting of the table reversing dogs. Table speed ranges are from 30 to 90 ft. per min. Traverse feed of the wheel is also hydraulically operated. The wheel automatically advances across the work a distance of 1½ in. at each reversal of the table. Both the quick-acting and the low-geared cross feeds, with automatic reversal, can be operated by a handwheel, either for grinding or for wheel truing.

All the motors are of the inclosed, fan-cooled, line-start type with full overload and undervoltage protection. The spindle motor is a.c. 15 hp., and will be supplied for 220, 440 or 550 volts, 60 cycles. A 5-hp. ball bearing motor drives the hydraulic coolant and lubricating pump.

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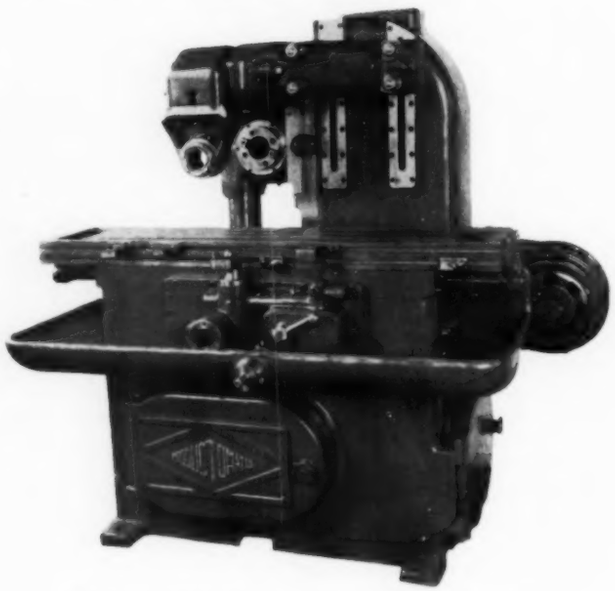
Producto-Matic No. 28 Milling Machine

A manufacturing-type miller adapted for miscellaneous milling operations will be shown by the Producto Machine Co., Bridgeport, Conn. In this medium-sized machine, pick-off change gears are used to obtain changes in feeds and speeds. The table is supported for practically its entire length. A quick-traversing mechanism returns the table at a speed of 300 in. per minute. Table feed ranges from ⅞ to 12½ in. per min. for cutting. The cutter spindle bearing is mounted on a heavy column and is adjustable vertically to locate the cutters in relation to the work. Drive to the cutter spindle bearing is by means of a worm close to the nose.

Specifications: floor space, 55x37 in.; size of table, over-all length, 53½ in.; length of working surface, 43 ½ in., and width over-all, 11 in.; longitudinal table feed, 30 in.; distance top of table to floor 35 in.; weight of machine, 3,500 lb.; size of motor, 3 hp., 1,750 r.p.m.



When changing set-ups the cutter-spindle bearing can be adjusted vertically to locate the cutters

MACHINE TOOL SHOW

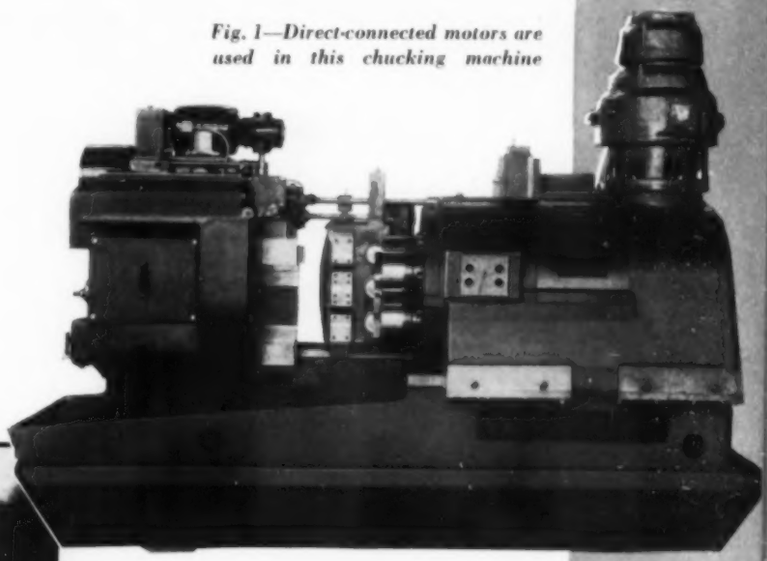
Goss & DeLeeuw Chucking Machine

Direct-connected motor drive is used on the five-spindle, work-rotating chucking machine offered by the Goss & DeLeeuw Machine Co., New Britain, Conn. The spindles are driven by a 10-, 15- or 20-hp. motor, which runs intermittently by means of an automatic switch controlled by the forward and backward movement of the tool-slide. Each spindle is equipped with a positive-jaw clutch. To stop the loading-position spindle, a cam, Fig. 2, is incorporated to provide for the engaging and disengaging of the spindle clutch during the indexing cycle, at which time the spindle-drive motor is stopped. This permits engaging of clutches without noise or shock. Feeding and indexing action is controlled by a 3-hp. motor which runs constantly.

Three heavy-duty cross-slides are provided in the second, third and fourth spindle positions and are located at the rear of the machine. Each one is operated direct by means of an individual hardened-steel cam. To provide for unusual chip space, the main tool-slide is suspended from large ways on the wall of the machine. Electric chucking is provided by means of a mounting at the rear of the spindle a reversing torque motor, Fig. 2, operated in the loading position by push buttons.

This machine consists of five spindles (four working spindles) with an 8-in. maximum swing. Maximum travel of the main tool-slide is 6¾ in., maximum travel of cross-slide is 6¼ in. Chucks 8 in. in diameter are supplied in 2- or 3-jaw type. Production cycle, 15 to 600 per hour. Weight 20,000 lb.

Fig. 1—Direct-connected motors are used in this chucking machine



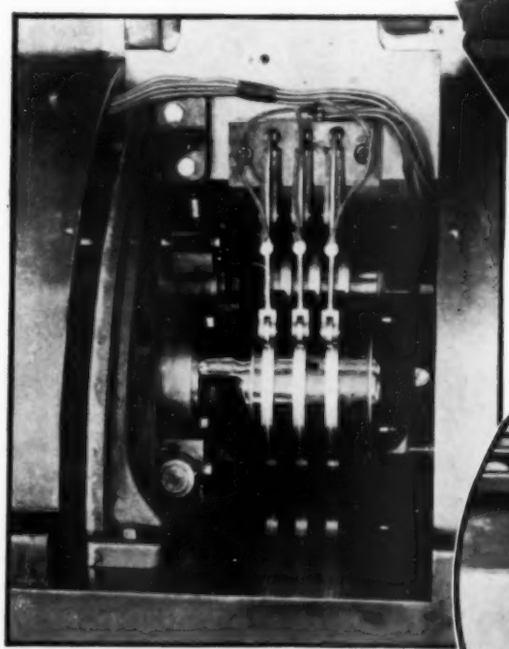


Fig. 2—A reversing torque motor on each spindle permits electric chucking

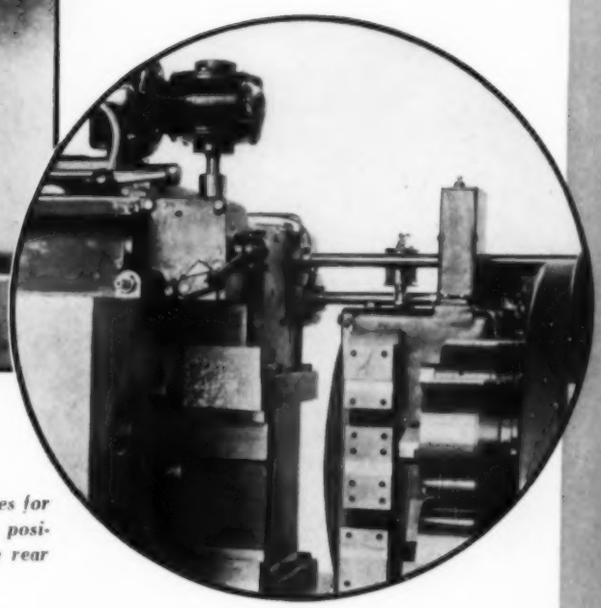
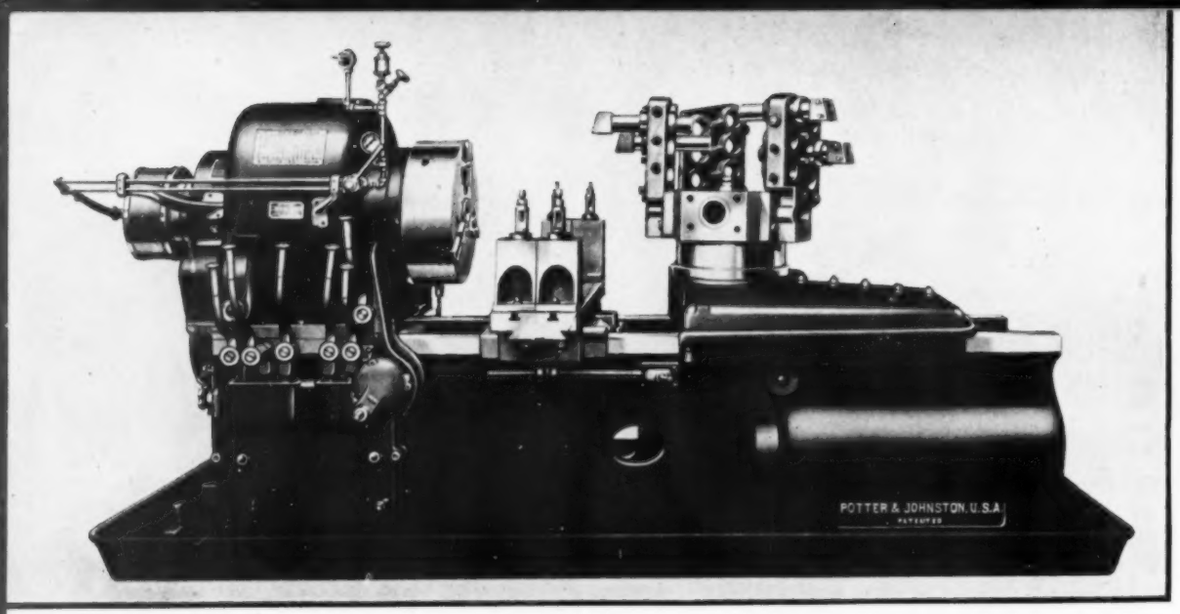


Fig. 3—Three cross-slides for the 2nd, 3rd and 4th positions are located at the rear



Three-jaw air or scroll chucks can be supplied in 21, 24 or 30 in. sizes for the 7-D automatic chucking and turning machine

Potter & Johnston Automatic Chucking Machine

There are 20 changes of speed between 11 and 248 r.p.m. in the No. 7-D automatic chucking and turning machine brought out by Potter & Johnston Machine Co., Pawtucket, R. I. These speeds are arranged in five sets of four automatic changes. Any group of four changes may be obtained by means of change speed gears. Feed gearing is driven from the spindle. There are 24 feeds in geometric progression from 0.007 to 0.250 in. per revolution. These feeds are in three groups, namely, coarse, medium and fine, and each group has an independent set of hand change gears located on the feed box. Feeds are independent of the high constant speed for idle movements of the turret slide while withdrawing, revolving and advancing the tools.

The cross-slide cam drum is located directly under the cross-slide and the ball bearing cam roll studs are mounted in the cross-slide, thus furnishing a direct connection. The cam drum is in a rear compartment accessible for special cams.

Hardened and ground steel inserts form the bearing on the base ways for the turret slide. Five turret faces are provided for the mounting of tools. The turret slide is adjustable so that the minimum distance between the spindle nose and the several turret faces may be varied 10½ in.

Specifications: swing over bed, 36½ in.; swing over cross-slide, 23 in.; travel of cross-slide, each way, 8½ in.; diameter of hole in turret, 3 in.; depth of hole in turret, 5 in.; total turret slide travel, maximum, 28 in.; turret feed, 13 in.; diameter of hole through spindle, 5¼ in.

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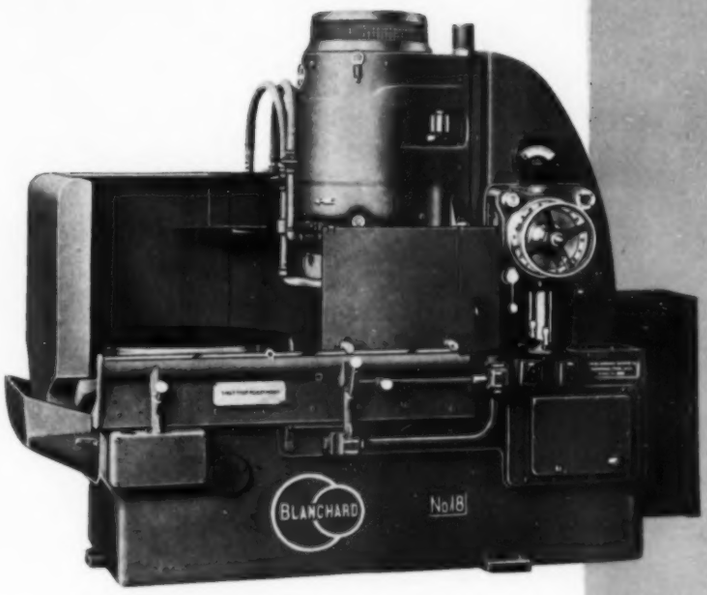
LeBlond 11-In. High-Speed Lathe

Design of the 11-in. high-speed production lathe developed by the R. K. LeBlond Machine Tool Co., Cincinnati, Ohio, is such as to take full advantage of tungsten and tantalum-carbide tools. Direct mounting of the dynamically balanced motor on the lathe spindle gives a vibrationless delivery of power. The lathe can be furnished with speeds of 450, 600, 900, 1,200, 1,800 and 3,600 r.p.m. Feeds from 0.001 to 0.014 in. per revolution of the spindle are obtained from nine changes of feed. Across-the-line starting brings the machine up to full speed in 2 sec., and electric plug stopping stops it in 2½ sec.

Blanchard Surface Grinder



Work height under the wheel is 12 in. The magnetic chuck may be 26, 30 or 36 in.

Power traverse for the chuck is a feature of the No. 18 surface grinder developed by the Blanchard Machine Co., Cambridge, Boston, Mass. This machine is similar to the No. 16, but has several improvements and additional features as follows: Waterguards open at the front; chuck face is lower for easier handling of the work; increased rigidity of spindle and main members of the machine; individual motor drives for table traverse, head raising and lowering, chuck rotation and water pump; feeds from 0.004 to 0.080 in. per min.; accurate feed stop for any distance less than 0.100 in.; water capacity of 125 gal. and a quick stop for the spindle.

This machine carries an 18x5x15-in. grinding wheel and a magnetic chuck which may be 26, 30 or 36 in. in diameter, with the work height under the new wheel 12 in. in all cases. An oversize 20-in. wheel can be used and the work height can be increased if so ordered.

A steel magnetic chuck is driven through a sliding gearbox, giving six speeds from 6 to 33 r.p.m. from a direct-connected motor. The feed handwheel, which makes one turn for 0.025-in. feed, has in back of it a dial which makes one turn for 0.100-in. feed. This dial carries the feed trip and has a quick-setting device by which it can be unlocked from the feed shaft and set to trip automatically at any amount of down feed less than 0.100 in. The lever which engages the feed also controls the rapid raising and lowering of the head, and the two motions are interlocked.

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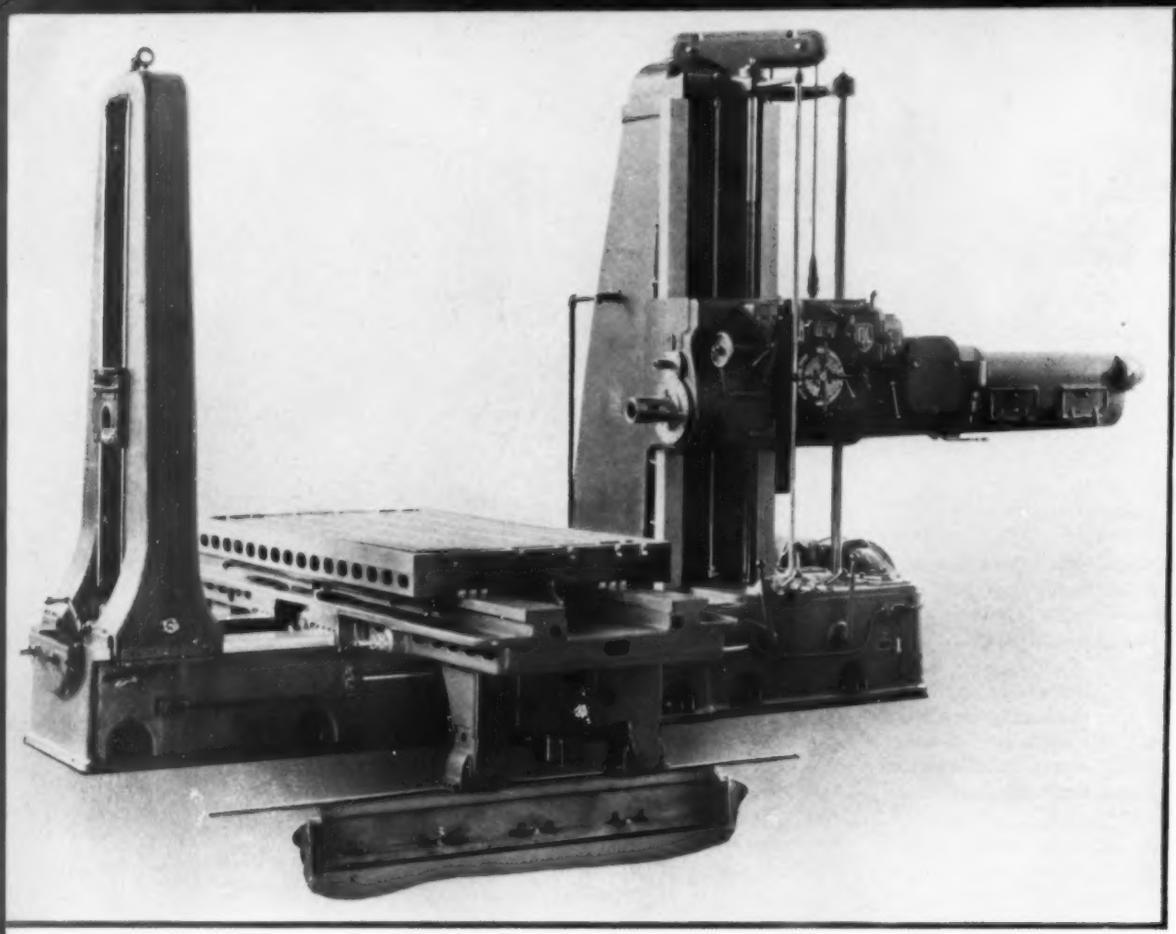
Zinc, aluminum, lead and tin can be handled by this machine

Madison-Kipp Die-Casting Machine

The Madison-Kipp Corporation, Madison, Wis., has introduced a die-casting machine, known as Model No. 6, which is intermediate between the Kippcasters and the automatic machines built by the corporation. It will handle all of the standard die-casting alloys in zinc, aluminum, lead and tin. As standard equipment it has an air-pressure gooseneck, but a plunger-type gooseneck will be applied if specified. The effective capacity of the standard air gooseneck is 5 lb. in zinc alloy, but oversize goosenecks are available. The metal pot capacity is 300 lb. in zinc alloy.

In addition to the features which characterize other Madison-Kipp machines, a Geneva stop mechanism for quickly moving the complete furnace assembly and for changing pots and goosenecks is included. The speed at which the machine is operated is determined by the rate of solidification that can be maintained in the die. Acceleration of solidification is accomplished by means of water-cooling cells in the die. The metal pressure gooseneck is automatically loaded with metal from the metal pot with each stroke of the machine.

Ejection of the castings is automatic with the opening of the dies, and it is possible to apply to the machine the Madison-Kipp automatic core-pulling mechanism. The machine is equipped with safety features to prevent metal being shot into the die until the die halves are closed and locked. A handwheel is provided for die-setting and for auxiliary operation if this should become necessary. Otherwise the entire machine is operated by power.



Two spindles, a large main spindle with a top speed of 375 r.p.m., and a smaller sensitive spindle running up to 1,500 r.p.m., make for versatility

Giddings & Lewis Horizontal Boring, Drilling and Milling Machine

Use of two spindles is one of the main features of the horizontal boring, drilling and milling machine, No. 350-T, manufactured by the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. On this machine milling and drilling operations are not secondary to boring, but all three are performed with equal efficiency.

A floor-type No. 350-FQ machine is similar to the No. 350-T, the main difference being a flange motor mounted directly on the head. This machine has an adjustable quill with sliding spindle.

Boring and heavy milling is performed with the large main spindle running at speeds up to 375 r.p.m., mounted in precision anti-friction bearings. High-speed drilling, tapping and milling work is carried out on the small, sensitive high-speed spindle which can be easily reversed at speeds up to 1,500 r.p.m. In order to obtain this high degree of sensitiveness for drilling and tapping with the high-speed spindle arrangements have been made to declutch the main spindle by simply moving a single lever.

"Directional Control" ties up the various levers operating the table, saddle and headstock units, in such a manner that a movement of the headstock lever either up or down causes a corresponding movement of the headstock up or down. Likewise, all other units always move in the direction the levers are actuated. Directional control requires a separate feed unit which is built into the base and operated by means of a "Rotary Selector" equipped with a direct-reading dial.

Safety trips limit the movement of the units in all directions. The entire design is coordinated in such a manner that whenever one or more table, saddle or headstock units run on to a trip, the operator can back off again under power by merely reversing the direction of feed. For production milling, adjustable stops are provided for the table cross feed and the vertical travel of the headstock.

Both the main and high speed spindles are protected in their end positions by ratchet teeth. Should the feed pinion run off the rack the operator needs only to reverse the direction of movement of the turnstile, which will automatically pick up the rack.

Operation of the table, saddle and headstock is entirely independent. All of these units may be started, stopped and reversed, singly or together. This arrangement materially adds to the usefulness of the machine as it enables the operator to

follow an irregular outline, using power feed to the table and headstock. Irregular outline can also be routed out or face milled with a vertical milling attachment, using power feeds to the table and saddle.

Rotation of the turnstile rapid traverses either the main or high-speed spindle by hand. Clamping the dial ring in a position corresponding to the desired depth engages the tripping device, which will then automatically disengage the feed within a 6 in. stroke.

The feed selector lever has two positions. In one the feed is engaged to the main spindle, while in the other the feed is switched to the high-speed spindle. It is impossible to engage the feed to both at the same time. The main spindle can be declutched and the feed engaged, enabling the cutting of keyways and other work requiring a reciprocating motion of the spindle, without rotation.

By cranking the selective levers either forward or backward nine changes of speeds, or feeds, are obtained. A single backgear for the feeds doubles up the number, giving eighteen independent feeds to each spindle speed, while two sets of back gears in conjunction with the speed selector provide 36 separate spindle speeds.

Beneath the cover plates, geared to the rotary selectors, are dials which, through openings, show the spindle speed or feed engaged. While cranking, the operator watches the window until the speed or feed wanted appears. With the backgear lever to the right the right-hand rows of feeds apply and vice versa.

The table and headstock movement are provided with a precision scale. The verniers are graduated to read in 0.001 in., and are adjustable so that they can be set to the nearest full inch for a starting point, eliminating a decimal figuring.

Specifications for the standard No. 350-T machine are as follows: Diameter of main spindle, 5 in.; longitudinal travel of main spindle, 36 in.; number of speeds to main spindle, 36; range of speeds to main spindle in geometrical progression, 6.25 to 375 r.p.m.; number of feeds to main spindle, 18; range of feeds to main spindle in inches per revolution of spindle, 0.010 in. to 0.500 in.; diameter of high-speed spindle, 2 in.; longitudinal travel of high-speed spindle, 9 in.; number of speeds to high-speed spindle, 36; range of speeds to high-speed spindle, in geometrical progression, 25 to 1,500 r.p.m.; number of feeds to high-speed spindle, 18; center distance between spindles, 8.750 in.; maximum distance top of table to center of main spindle, 48 in.; working surface of table, 36x72 in.; cross travel of table, 60 in.; constant-speed motor, 15 hp., 1,200 r.p.m.

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U. S. Adjustable Speed Grinder

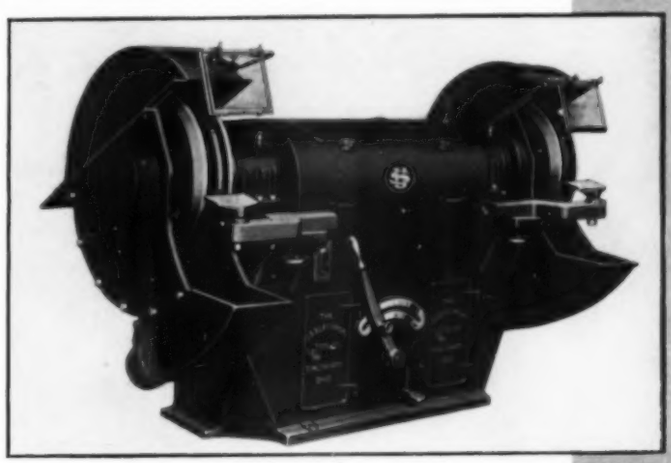
The adjustable-speed, alternating-current grinder, Model 65, announced by the United States Electrical Tool Co., Cincinnati, Ohio, is equipped with a patented gear-drive transmission. Four wheel speeds are quickly available, controlled by gear-shift lever. This speed lever is interlocked with the guard, which makes it impossible to run the wheels at a dangerous rate of speed. With this drive an efficient peripheral speed can be maintained. Speeds of 9,500 s.f.p.m., maximum, to 8,500 s.f.p.m., minimum are maintained.

Motors are rated for continuous service with a temperature rise of 40 deg. They run on heavy-duty ball bearings inclosed in a dust-proof housing. Pushbutton control carries no-voltage release and overload protection.

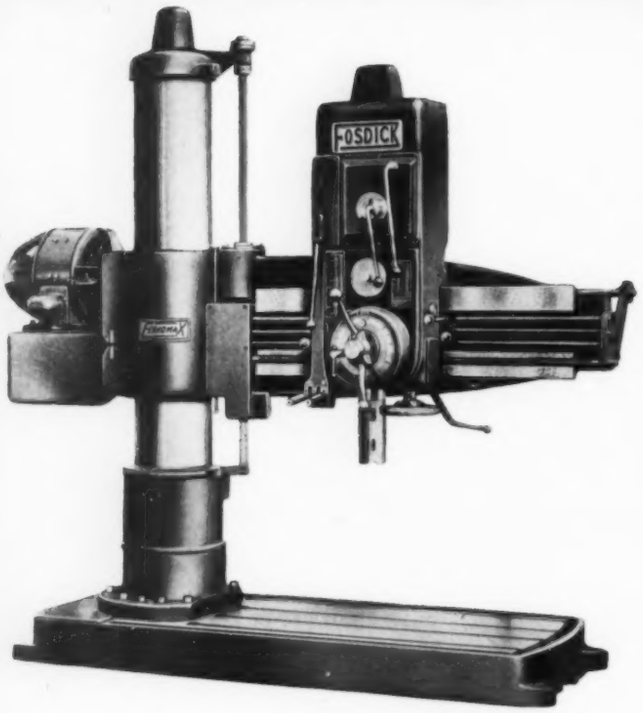
Wheel guards are of boiler plate, and are of the adjustable type with permanent exhaust connections. The adjustment of the guards does not interfere with the exhaust outlets.

On the Model 65 grinder the heavy wheel flanges are keyed to the spindle and are provided with adjustable weights, mounted in grooves, on the side of the wheel flanges for balancing the grinding wheels. The grinder is available in 3-hp., 12-in., to 15-hp., 30-in. sizes.

The purpose of the speed changes, of course, is to compensate for reduction in wheel diameter caused by wear. On the model using a 24-in. wheel the beginning speed is 1,550 r.p.m., which gives a surface speed of 9,500 f.p.m. When the wheel wears to 21 in. the surpace speed is 8,550 f.p.m. At this point the spindle speed is increased to 1,750 r.p.m., which raises the wheel speed to 9,500 surface f.p.m. When the wheel has worn down to 19 in. the original surface speed is regained by stepping up the spindle speed to 1,900 r.p.m. This can be done once more at 17 in. by speeding the spindle to 2,100 r.p.m.



Four spindle speeds permit the operator of this U. S. Electrical grinder to use a wheel efficiently as it wears down



On this 5-ft. radial drill, the elevating handle, column clamping handle, and rapid traverse handle are arranged to return automatically to their vertical positions when released

Fosdick Radial and Sensitive Drilling Machines

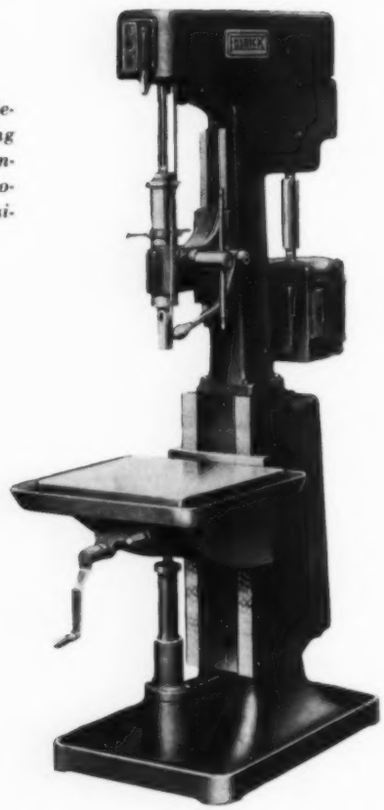
Sensitive controls affording time-saving short cuts are found in the 5 ft., 17-in. column radial drill, developed by the Fosdick Machine Tool Co., Cincinnati, Ohio. Finger tip control of the head allows the operator to rapid traverse it or to cause it to creep for accurate positioning. The rapid traverse lever is located on the right side of the head and is self-indicating for direction. It hydraulically traverses the head at any speed up to 15 ft. per min. Also on the right-hand side of the head is a handle that controls the clamping or unclamping of the arm by hydraulic means.

At the left of the head is a lever for clamping the head to the arm by means of a mechanical arrangement. On the same side is the arm raising and lowering handle, which is self-indicating for direction, and which controls the hydraulically operated elevating clutch. The same handle also controls the hydraulic clamping of the arm to the column sleeve.

Power is derived from a motor mounted on the arm and connected through a reduction gear to the back driving shaft at the head. This motor also drives the hydraulic pump for supplying power to control and traverse the head and arm.

The arm is mounted on the column sleeve on a sliding bearing and is clamped to the sleeve by an hydraulic self-locking clamp. The sleeve rotates on the inner column and is mounted on a heavy ball bearing at the top of the column and a pair of roller bearings at the bottom, so the arm will swing readily. The hydraulic clutch for arm movement has Nitralloy plates.

Thirty-six speed changes are found in the head, obtained by shifting sliding gears. Eighteen feeds range from 0.003 to 0.125 in. per rev. and incorporate three pipe leads, 14, 11½ and 8 threads per in. Feed is engaged by a friction clutch and is provided with a direct-reading depth dial.



Sensitive control of tapping is gained in the Fosdick No. 4, 16 in. drill by means of reversing motor drive

Sensitive Drilling Machines

An arrangement that enables the operator to bottom tap very accurately is provided on the No. 4, 16-in. sensitive drilling machine offered by the same company at the Machine Tool Show. This arrangement is secured through an adjustable depth stop which backs out the tap at any predetermined point. Drive is from a direct-coupled, two-speed motor. With a three-speed gearbox a total of six speeds, from 225 to 1,800 r.p.m. are available. The tapping attachment is of the reversing-motor type and is controlled by motion of the rack-pinion handwheel. When the spindle is brought down it runs right-hand and when it is returned the spindle reverses.

The No. 5 sensitive drill is similar to No. 4, but

has a power feed instead of a tapping attachment. This is engaged by a downward motion of the handwheel and disengaged by an upward motion. A depth stop disengages the power feed and is accurate to within 0.010 in. for the depth of the hole. The depth is easily set on a direct-reading dial. Either power feed or reversing tapping control can be applied to the No. 4 and No. 5 machines. No. 4 has drill capacity of 7/8 in. in cast-iron and is built in 16-, 24- and 30-in. sizes. The No. 5 drill has a capacity of 1¼ in. in cast-iron, and is built in 16- and 24-in. sizes. Both machines can be obtained with from one to six spindles and in any combination of speeds or special attachments.

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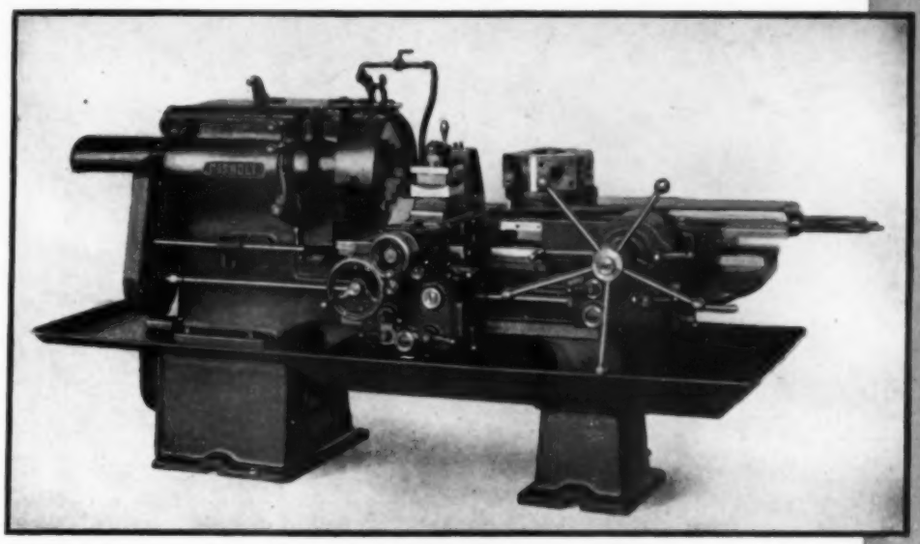


Available in both plain and universal models, the Gisholt No. 3 turret lathe is designed for high speed operation on light work without sacrificing rigidity

Gisholt No. 3 Turret Lathe

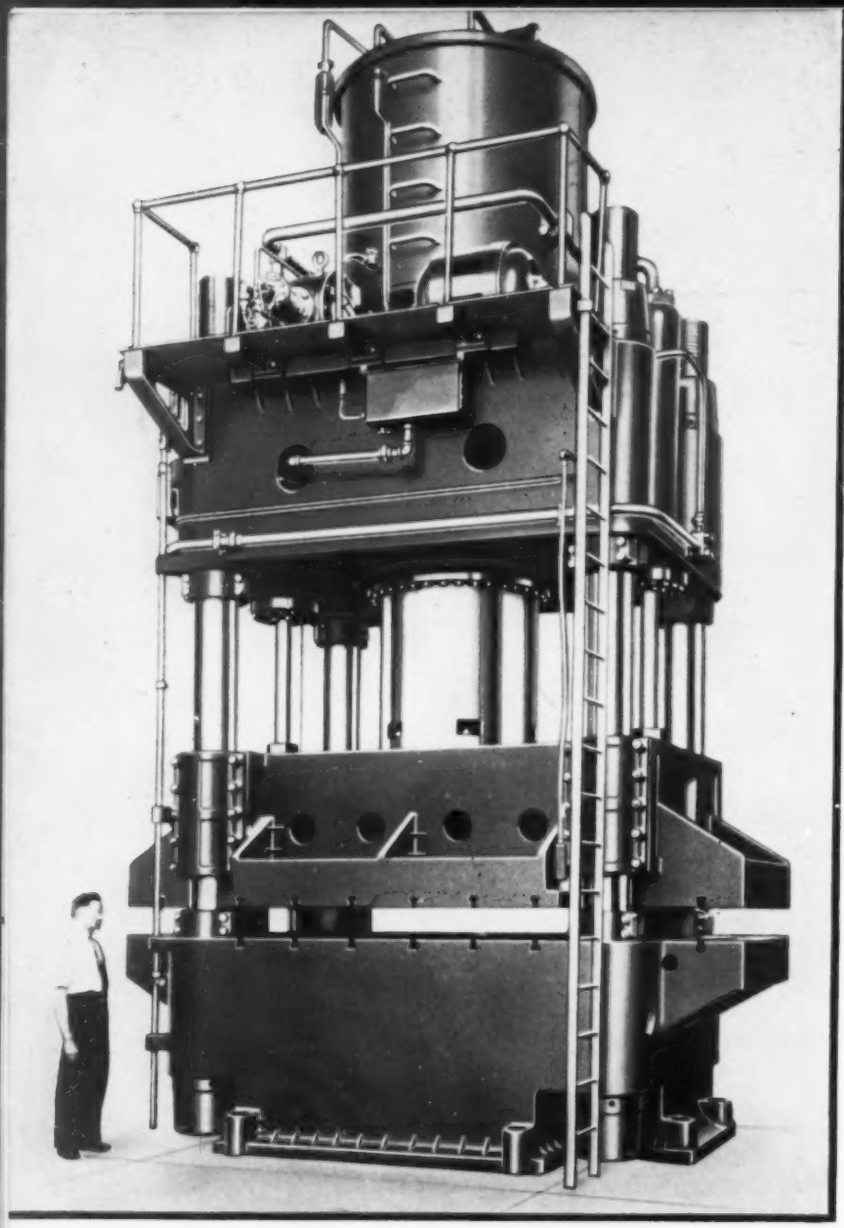
Designed for fast manipulation on light work, yet retaining the power and rigidity for the heavy work within its capacity, the No. 3 turret lathe announced by the Gisholt Machine Co., Madison, Wis., has a bar capacity of 1½ in. diameter by 10 ft. length, and a chucking capacity of 9⅝ in. swing over the cross-slide, or 18½ in. swing over the ways.

Six spindle speeds and reverse may be obtained in the normal speed range of 65 to 730 r.p.m., for general purpose work, or with a higher or lower range for specific needs. The six speeds are conveniently arranged in two groups of three high speeds and three low speeds. A multiple disk clutch between these two groups permits shifting instantaneously without stopping the spindle from one group to the other. In each group of three speeds, a single lever selects the proper spindle speed through sliding gears mounted upon an integral and multiple splined shaft. A single control lever on the side of the headstock starts, stops and reverses the spindle through powerful multiple-disk clutches. A spindle brake is automatically applied when this lever is in its neutral position. Accidental starting of the spindle is prevented by a safety latch. The spindle nose, which is forged integral with the spindle, is of the flanged type. Drive from the spindle to a work holding member is through a steel key, 1 in. wide by 1 in. long, located at the periphery of the 8 in. flange. The flanged nose eliminates the tendency of chucks and fixtures to tighten upon the spindle and danger of them spinning off when the spindle is brought to a prompt stop.

The cross-slide has eight power feeds, both cross and longitudinal, and reverse in both directions. These eight selective feeds are contained in the universal apron and are independent of the turret feeds. A square turret toolpost on the universal cross-slide is indexed from one station to the next by a to-and-fro movement of the handle. This movement unclamps, indexes and clamps the turret.

The turret ram is of sufficient length so that in all possible working positions of the turret, it has a bearing on the full length of the saddle. The automatic turret clamp not only insures the turret being clamped properly and firmly on every forward movement, but also saves the operator the twelve movements otherwise required to clamp and unclamp the turret for each full cycle of the tools. A double bevel clamp ring with powerful eccentric toggle takes the entire strain of the cut so that none of it is transmitted to the locating pin and bushings.

Motor drive is generally of the V-belt type, although a vertical base motor mounting and flat belt, chain and countershaft drives may be used.



Having an overall bed span of 180 in., this is one of the largest hydraulic presses ever built

"H-P-M Fastraverse" Production Hydraulic Presses

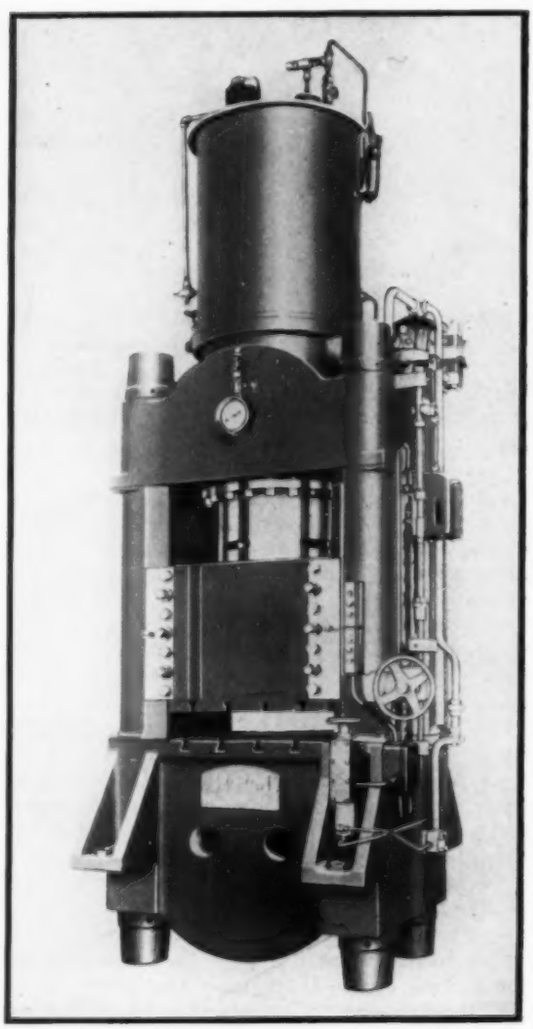
A newly improved line of hydraulic presses has been announced by the Hydraulic Press Manufacturing Co., Mt. Gilead, Ohio. This line is known as the "H-P-M Hydro-Power Fastraverse" Line. The basic principles of the first press of this type which was introduced at the Machine Tool Show in 1927 are continued in the current models.

The hydraulic circuit provides for the direct pressure connection between the source of pressure and the press cylinders without intervening valves. All press movements are controlled by varying the pump output. The pump is of the high-speed, rotary, radial-plunger type with variable reversal stroke. Variation of the pump stroke is secured through hydraulic pressure from an auxiliary pump. Interconnection with the control actuating means provides an automatic follow-up action with sensitive response to every change. Thus, the pump stroke may be sustained at full-stroke position in either direction, or at any intermediate point or at neutral, as required.

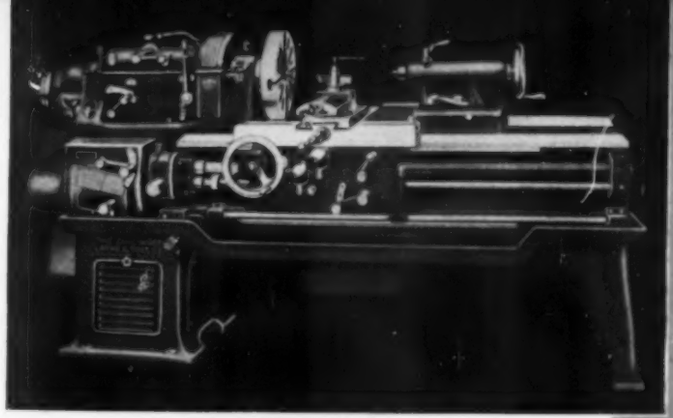
Communication between the overhead oil supply tank and the main cylinder for surging the oil in and out during rapid traverse movements of the ram is controlled by a floating poppet surge valve. To reverse the press in the minimum time and yet avoid shock, the system includes a second element for decompressing the oil in the main cylinder immediately following the attainment of peak pressure.

In the event of any power failure or loss of pump control pressure, a special safety device automatically places the radial pump at neutral. This device safeguards the workmen by preventing the press from dropping unexpectedly which might happen with a press not so equipped. For die set-up and testing a manual control is provided to give accurate regulation both of speeds and of

"Fastraverse" of the closed upright type with shrunk tie rods



A plunger locks the spindle when removing chucks and faceplates, preserving accuracy of the head

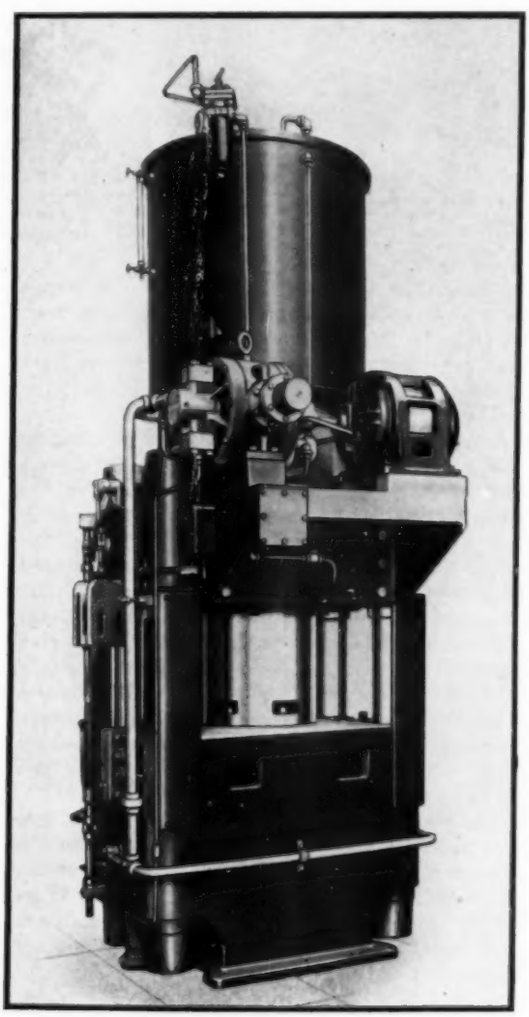


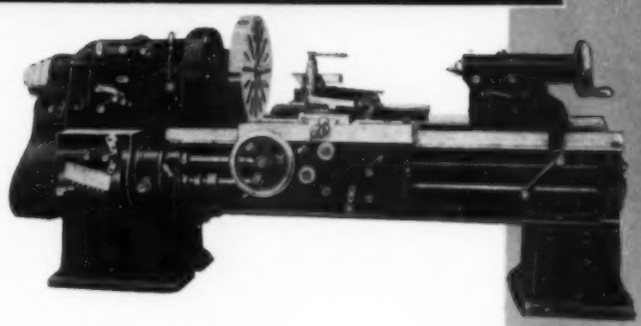
direction of ram movement. For automatic operation of the press there is a combination hydro-electric control which involves pushbutton start, automatic pressure reversal, instantaneous emergency reversal, and other features. When set for semi-automatic operation, the press rams stops at the initial position at the end of each cycle. With full automatic operations the same cycle is repeated, change from one mode of operation to another being effected by an electric switch.

Two types of press frames are included in the hydro-power line. The open rod type and the closed upright shrunk rod type. In the open rod press the uprights serve both as tension members and as guide rods for the moving platen. This is feasible because there is no side thrust. The closed upright press, on the other hand, has tapered gib guides which are adjustable both front and back to maintain alignment of the ram and platen.

H-P-M presses are available in standard sizes, varying in 12 in. increments of bed areas, and in pressure capacities from 100 to 5,000 tons.

Rear view showing Hydro-Power Press of the open-rod type



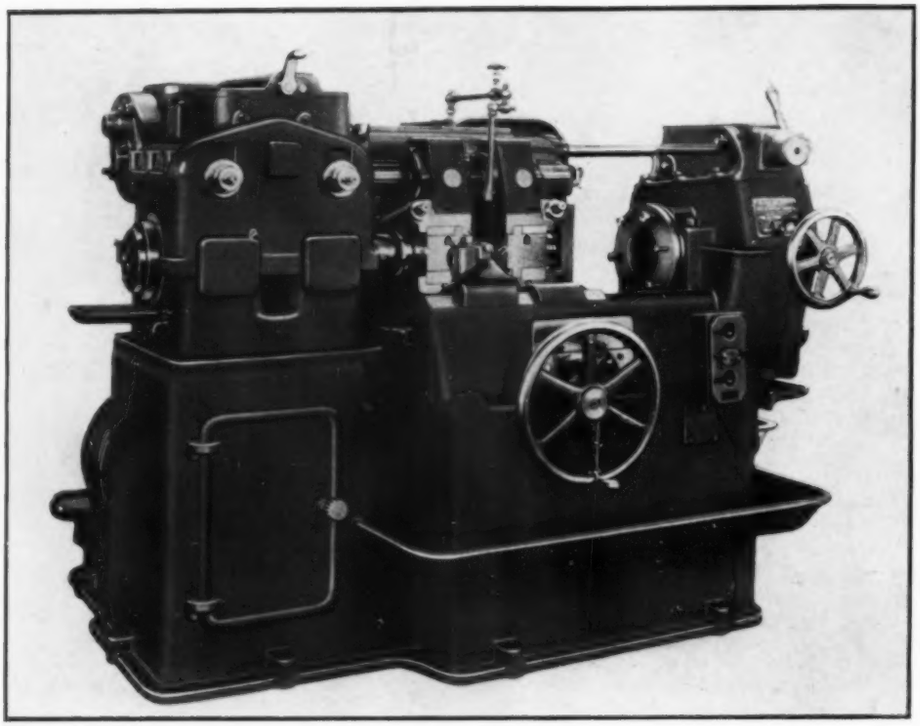


Cincinnati Heavy-Duty and Toolroom Lathes

Two lathes having many features in common will be exhibited by the Cincinnati Lathe & Tool Co., Oakley, Cincinnati, Ohio. One of them will be an 18-in. by 8-ft. toolroom lathe with the motor mounted inside of the leg. This machine is fitted with an oil pan and pump, and taper and nose-type draw-in attachments. The other machine, a 22-in. x 10-ft. geared head, heavy-duty lathe, is fitted with a special double rest permitting a series of cuts to be taken simultaneously with a number of cutting tools.

These lathes are fitted with a plunger for locking the spindle when removing chucks and faceplates. The use of this plunger preserves the accuracy of the head and keeps strain from the gears and shafts in the head. A quick-change gearbox is fitted as a unit to the front. From it 32 to 96 changes are made by simply shifting two levers, and without the use of an auxiliary quadrant. Twelve spindle speeds are obtained in geometric progression by shifting three levers. The speed required, from the lowest to the highest, is obtained direct without going through unnecessary changes. Additional speeds can be supplied when required to machine to the limit with carbide tools. The clutch is of the compression-disk type and is operated by a lever on the apron, or by the one on top of the head for starting and stopping. This design prevents drifting and accidental starting when not in use.

Lathe beds are made of 80 per cent steel and 1 per cent nickel, and are heavily reinforced. Automatic forced-feed lubrication is furnished for the quick-change gearbox, spindle bearings, bed ways, carriage, apron, compound rest and the end of the lathe.



Farrel-Sykes Improved Gear Generating Machines

To enhance the accuracy of the product, to increase the output and to facilitate operation, the Farrel-Birmingham Co. Inc., Buffalo, N. Y., has made a number of improvements in its Farrel-Sykes gear generating machines. An improved cutter relief mechanism permits higher operating speed and increases the accuracy and improves the finish of the work. Thus, it is possible to perform new machining operations which are entirely disassociated with gear cutting.

This cutter relief mechanism positively and automatically withdraws the cutters from the work during their return stroke and thus prevents damage to the cutting edges of the tools. During the cutting stroke the mechanism locks the housings carrying the cutter spindles with the cutter heads. Cams which effect the withdrawal of the cutters are out of contact during the cutting stroke so that they have no effect on the accuracy of the work. Operating parts of each cutter head are lubricated by an individual pump which uses the relieving bar as a pump piston. This not only assures lubrication, but is a simple design for delivering oil to the cutter heads which must be adjustable on the reciprocating carriage.

The helical guides are of new design. In place of one groove and one shoe in each guide, two are now provided. In the smaller machines the shoes are carried in a flanged sleeve which also carries the reciprocating guide member. Therefore, each set of guides is an integral unit readily removable, thus providing an easy means of changing from helical to straight teeth or from one helix angle to another.

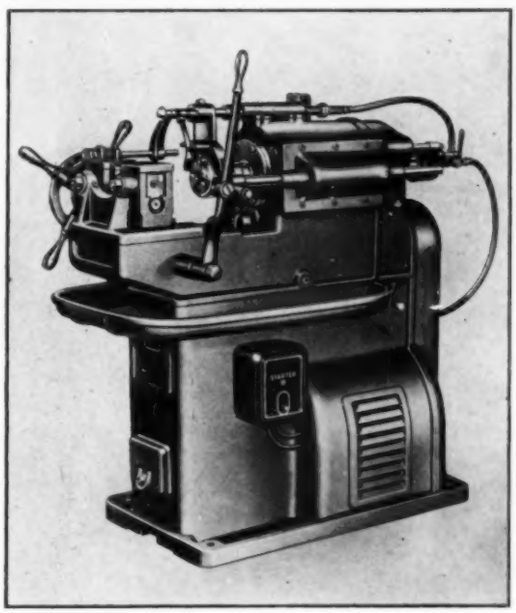
An automatic in-feed, or depth feed, mechanism automatically feeds the work towards the cutters in any desired increment per revolution of the work. These increments may be uniform or variable as required. Deep roughing cuts and fine cuts may be made automatically without the need of a cam and without any special attachment. Depth of feed per revolution or the total depth of cut can be altered or regulated without stopping the machine. Embodied in this mechanism is a device for withdrawing the work from the cutters when the finish cut has been made and for stopping the machine. Therefore, the machines are fully automatic except for the setting up and changing the work.

The gear and feed box have been combined into one unit which makes it possible to reduce the number of gears in the train and to improve the accuracy and simplicity of the machine. Ways for the outer work support bracket are hardened, and the design has been altered to permit quicker adjustment and more accurate alignment.

MACHINE TOOL SHOW

Geometric Hand-Operated Threading Machine

In this threading machine the work is held stationary while the spindle carrying the diehead slides toward it in a quill



While the No. 12 threading machine, offered by the Geometric Tool Co., New Haven, Conn., is a hand-operated machine for general-purpose work, it is a sturdy machine with convenient operating levers for rapid production. It may be equipped with or without a leadscrew at the option of the user.

An unusual feature of this machine is that the spindle carrying the diehead advances onto the work which is held stationary. The spindle slides in a quill which is mounted on a large taper roller bearing. Power is transmitted from the quill to the spindle by means of a spider, the trunions of which are mounted in ball bearings. The construction insures sensitive sliding action and prevents any undue drag on the threads being cut. Travel of the spindle is 5 in.

Although the machine does not come equipped with any work-holding device, a standard screw-type stationary vise mounted on a carriage can be supplied. Four changes of spindle speeds are available. For left-hand threads, a motor arranged with a reversing switch is supplied when the machine is motor driven. With belt drive a special reversing countershaft is necessary.

Specifications: Capacity, ¼ to 1 in. straight threads; 8 threads per inch or finer; ⅛ in. to ¾ in. standard pipe threads; floor space, 55x26 in.; net weight, 1,550 lb.

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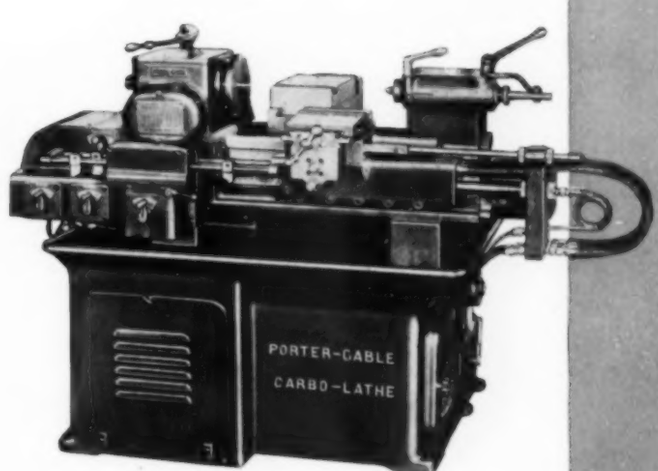
Porter-Cable Hydraulic Lathe

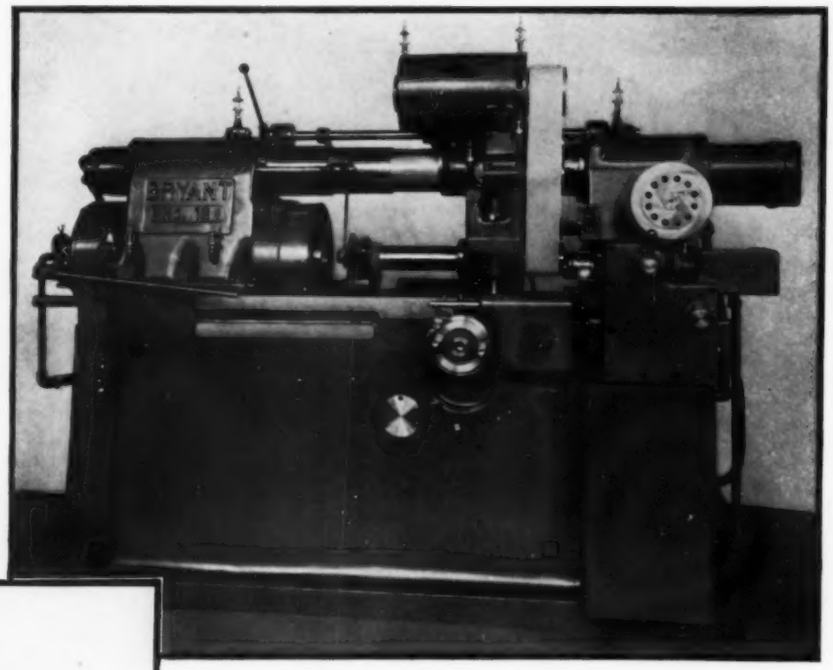
Built for manufacture of small- and medium-size parts, the "Carbo" hydraulic lathe offered by the Porter-Cable Machine Co., Syracuse, N. Y., has a full automatic cycle. It is designed for the efficient utilization of high-speed steel and tungsten-carbide tools. The hydraulic actuation assures longer tool life and the parts are duplicated within very close limits because of the accurate automatic setting of all tool-slides at the start of each cycle. Hydraulic power feed to the cross-slide of the front carriage is an improvement. On short-cycle operation loading time is decreased by the quick starting and stopping of the spindle.

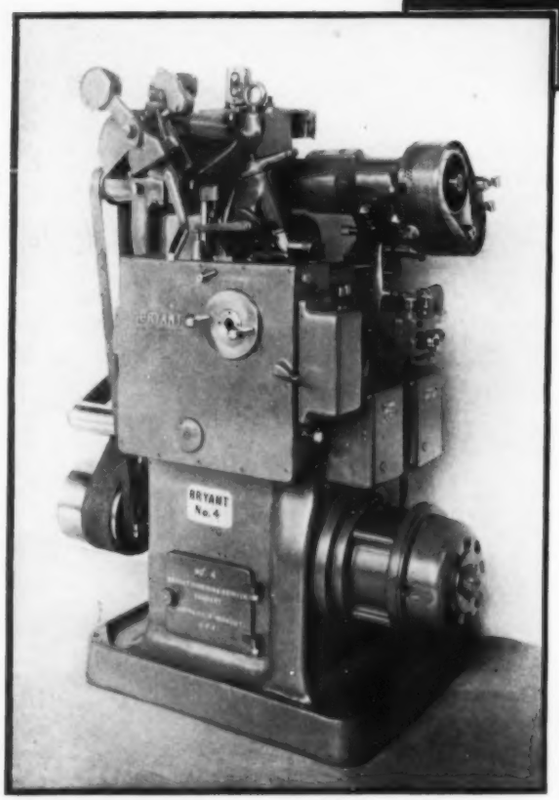
Specifications: Spindle speeds of 95 to 1,130 r.p.m. with low-speed head; speeds of 167 to 1,978 r.p.m. with high-speed head and 1,800 r.p.m. motor. Distance between centers 18 in.; swing 14 in. over the ways, 7 in. over the carriage; feed, 0 to 24 in. per min., rapid return, 15 ft. per min. can be reduced to 8 ft. per min.; individual control of feed to each tool-slide. Permissible travel of back-facing attachment, 5 in. Motor, 10 hp.



This hydraulic lathe with full automatic cycle for the manufacture of parts of small and medium size uses carbide tools

All of the Bryant machines are being equipped with wheelheads of new design, giving smooth operation and producing fine finish with long life of the wheelhead bearings





Bryant Internal Grinders

High-production grinding of small-diameter bores in bearing rings, bushings, rolls and gears is the field of the No. 4 automatic grinder designed by the Bryant Chucking Grinder Co., Springfield, Vt. The machine embodies the firm's automatic electric sizing device. Total chuck swing without guard is 6½ in. in diameter and the maximum wheel-slide traverse is 3¾ in. A crank traverse for the grinding stroke gives a very smooth control of the wheel on a short stroke. In many cases it is desirable to run the wheel slide at a higher rate; a crank mechanism does this with less shock and vibration.

This machine is intended particularly for big-production jobs which come under 2 in. in length. That is why the crank traverse is employed. Also when grinding splined holes with very narrow necks or grinding close to a shoulder, it is desirable to have the positive stroke given by the crank mechanism. With a special traverse arrangement this machine can be arranged for grinding holes greater than 2 in., and up to 3 in. in length.

Compressed air at 80 to 65 lb. per sq.in. is used to carry the wheel-slide in and out of working position and thus maintain high production. The wheel-slide is brought to rest position, the work rotation is stopped, and the chuck is opened through cylinders working automatically. The operator controls the wheel-slide traverse by a single hand lever. The same lever controls the closing of the chuck and the starting of the grinding cycle. Automatic sizing on the grinder is universally applicable for blind, taper and straight open holes. The cycle is divided into four stages—chucking, rough grind, finish grind and dress wheel. The order may be changed if the character of the work makes it desirable to dress before finish grinding. Finish grinding can be done at a slower rate of feed than the rough grinding.

MACHINE TOOL SHOW

Medium-size work is taken on the No. 16 chucking grinder offered by the Bryant Chucking Grinder Co., Springfield, Vt. This machine has a capacity of 16 in. in diameter without the guard and a 15½ in. maximum wheel-slide traverse. While designed primarily for grinding holes up to 8 in. in length the machine can handle work up to 14 in. in length on occasion. The No. 16 can be furnished either with or without automatic sizing. For work within its capacity it is suitable for mass production at a high rate or for general manufacturing where the lots are smaller, such as in machine tool manufacturing. The machine is also convenient for toolroom work or small lot jobs.

Full hydraulic control is afforded by utilizing the slide bar as a cylinder for the slide traverse. In addition to traversing the wheel-slide hydraulic means are provided for automatically operating the wheel-truing device, the cross feed, and the lifter for swinging the wheel-slide into position for chucking, grinding or other movements required by the cycle.

Construction of the work-spindle mounting gives a quick and simple universal adjustment for lining up the work spindle with the slide bar of the machine. Moreover, the machine incorporates the suspended wheel-slide design used on Bryant machines. Wheelheads of improved design afford smoother operation and longer life.

Other machines in this series are the No. 16-A, a two-spindle hole and face grinder, and No. 16-L gap grinder the same length but capable of handling work to 30 in. in diameter. It will grind holes in connecting rods, die rings, and gears, which require a large swing and yet are not heavy enough to need the heavier Bryant No. 24 grinder.

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Whitney No. 128 Heavy-Duty Punch

Welded-steel construction is used for the No. 128 heavy-duty punch offered by the Whitney Metal Tool Co., Rockford, Ill. The machine comes equipped with a gear reduction motor giving 125 r.p.m. on the main shaft. Other features are three-station clutch pins in the flywheel, adjusting brake shoe on the main shaft, a safety device when changing punches and dies to prevent the ram from descending. The flywheel is at the rear of the machine to prevent interference with the work. The machine will be made in a back-geared type for drawing work with strokes as low as 35 per min.

Specifications: length of stroke, 1¼ in.; punch hole in ram, 1 in.; length of ram, 7½ in.; width of ram, 5½ in.; stroke adjustment, 1¾ in.; depth of throat, 8 in.; die space with stroke down, adjustment up, 4 in.; size of bolster plate, 11¼x6x12 in.; weight, 710 lb.

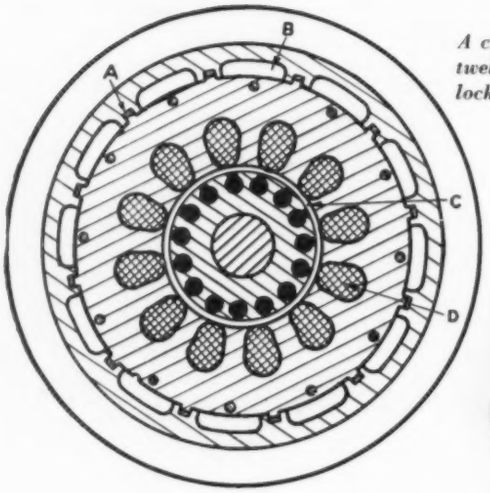
Using box-type welded construction, the design of this punch has been carefully guarded against complicated construction

Dayton Cast Pulleys and Oil-Proof V-Belts

Cast-machined pulleys are available for all ratings up to 15 hp. Daycoil V-belts have run for hundreds of hours submerged in oil without deteriorating

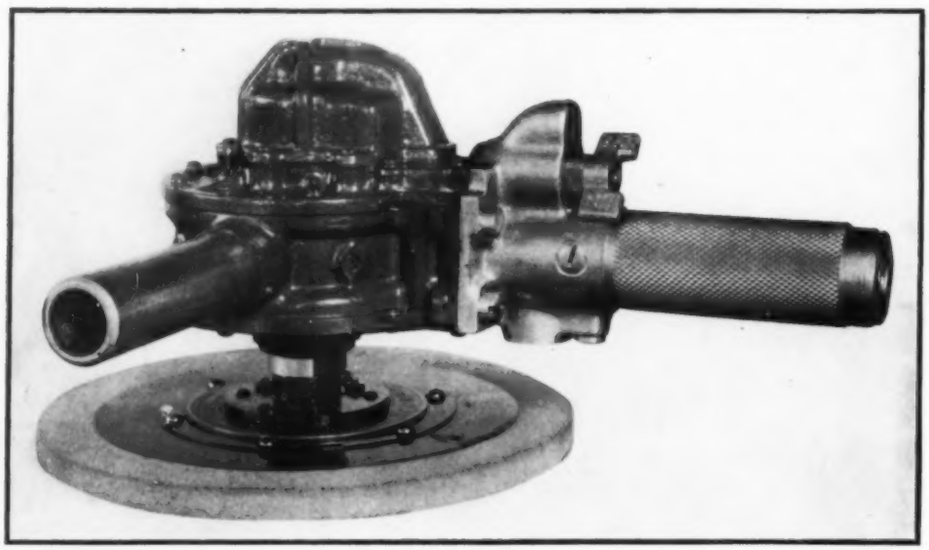
The Dayton Rubber Mfg. Co., Dayton, Ohio, will exhibit a line of "Day-steel" pulleys of cast-machined (semi-steel) construction, also the "Day-coil" oilproof V-belt. The cast-machined pulleys are approximately of the same weight as the pressed steel pulleys. The special semi-steel gives a smooth, close-grained groove surface. Pressed-steel pulleys of the same diameters as the cast-machined type will continue to be offered.

Daycoil V-belt has the same laminated construction as in the regular Dayton Cog-Belt for general transmission applications, and also a special casing of synthetic compound to resist oil. The synthetic material has all the properties of natural rubber such as flexibility, elasticity and resiliency, plus aging properties many times that of rubber and greater abrasion and wearing qualities when subjected to oils and solvents. The belts have showed no signs of swelling, stretching or wearing after hundreds of hours of running submerged in oil, whereas ordinary belts go to pieces quickly.



A cross-section reveals that twelve slots in the housing lock the stator laminations

This high-cycle grinder is representative of a line that includes straight and right-angle grinders, buffers and sanders. Two weight classes are 13 and 15 lb.



A four-port governor controls free speed, reduces air consumption for the Rotor Type B-1 sander. Handles close to the work guide the tool to best advantage

Rotor High-Cycle Electric and Pneumatic Tools

The Rotor Air Tool Co., Cleveland, Ohio, has announced a line of high-cycle electric tools which includes the following: 4-, 6- and 8-in. grinders, 6- and 8-in. buffers, 7- and 9-in. disk sanders, and 6-in. right-angle grinders. These tools are made in two weight classes, 13 and 15 lb.

Several innovations have been incorporated in the design of these tools, which it is claimed have, without increasing the weight, greatly increased the power factor, operating efficiency and life, giving higher load speed. The motor is of the welded-copper, squirrel-cage type. Inside of the casing are twelve broached slots to receive twelve keys on the stator laminations. These laminations are held together by twelve lamination rivets, eliminating possibility of the stator working loose. Heretofore, the stator was pressed in the casing and held by means of pin screws. After a short period of service the vibration caused the stator to work loose. The present construction allows space for twelve exceptionally large air channels in the casing to afford proper cooling by means of a solid web fan.

Magnesium alloy is used for the handles and casing to give high strength with light weight. To maintain proper alignment, the bearing structure is built integral with the casing. All ball bearings are seal protected. The handle provides room for two fuses, giving greater protection to the tool against damage from shorts or accidents. The handle is insulated from the motor and is equipped with a quick-detachable cable protected at the entrance to the handle with a coil spring to relieve strain and damage to the cable.

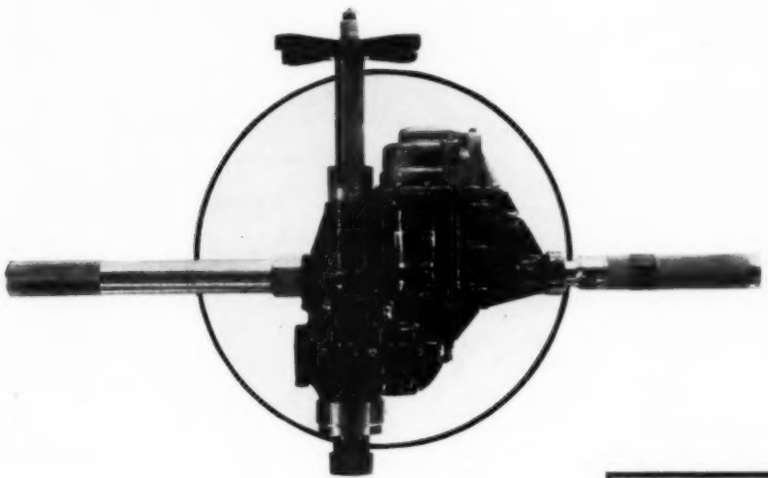
A disk sander, carrying a 9-in. sanding pad and weighing only 10 lb. is being built. Designated as the Type B-1, this sander is equipped with a motor of the twin-rotor external blade type. Two handles, placed at right angles, are close to the work and make it possible to guide the tool with a minimum of effort. A four-port, quick-acting governor controls the free speed, greatly reducing the air consumption while the tool is running idle. This tool is made in several different speeds suitable also for use with cup-shape wire brushes and cup-shape grinding wheels. Fine balance is assured by the design.

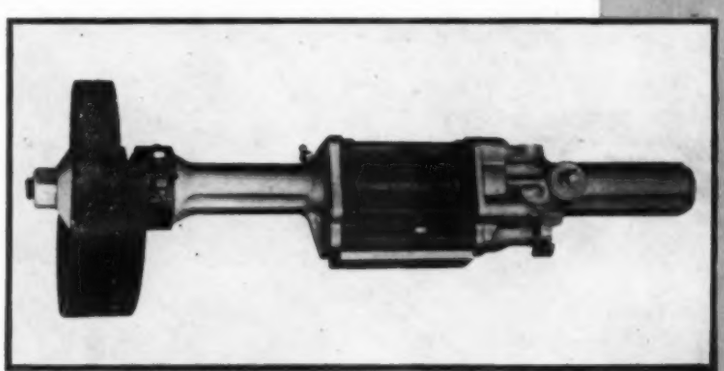
The Type E-50-C drill is manufactured in both reversible and non-reversible types and in two speeds. The 450-r.p.m. model is rated at $\frac{3}{8}$-in. drilling and $\frac{1}{2}$-in. reaming capacity; the 360-r.p.m. model is rated for 1-in. drilling and $1\frac{1}{8}$-in. reaming capacity.

The motor is of the twin-rotor, external-blade, rotary type. A four-port quick-acting governor controls the free speed, thus preventing excess wear on the motor and excess drill and reamer breakage. Weight is 20 lb. so that work formerly done by two men can be done by one.

The Type D-0-2 6-in. grinder weighs 9 lb., has a twin-rotor type motor. The design eliminates pistons, toggles and connecting rods and permits the use of a one-piece spindle. Handles are made of magnesium alloy for lightness and balance.

A step-up in power has been achieved by a four-port governor which responds instantly to the load applied. This quick-acting governor does not permit the tool to speed up beyond the safety limit. It also cuts down the air consumption when the load is released.





Above—The Type E-50-C pneumatic drill is built in two models of different speeds and drilling capacities. A twin-rotor motor eliminates numerous parts. Right—The 6-in. Type D-0-2 pneumatic grinder has handles made of magnesium alloy to reduce weight. It has a four-port governor

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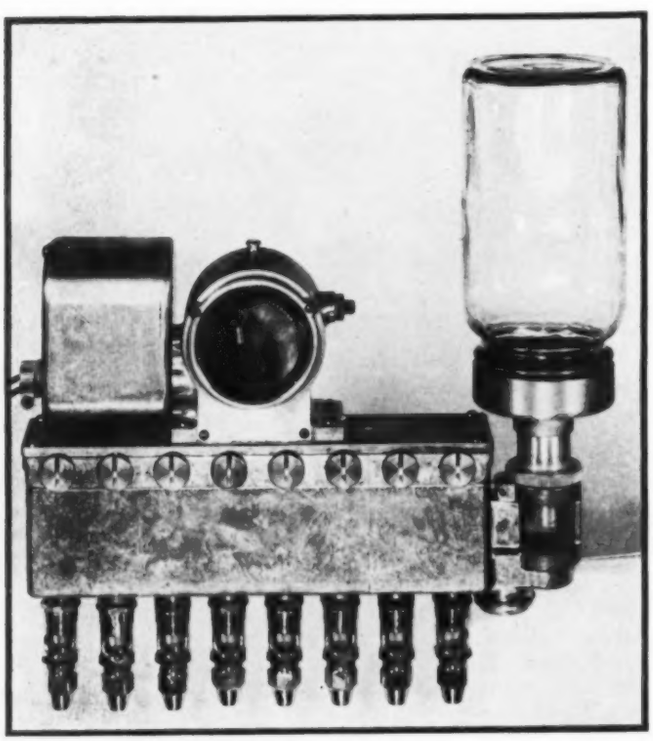
"H & G" Diehead

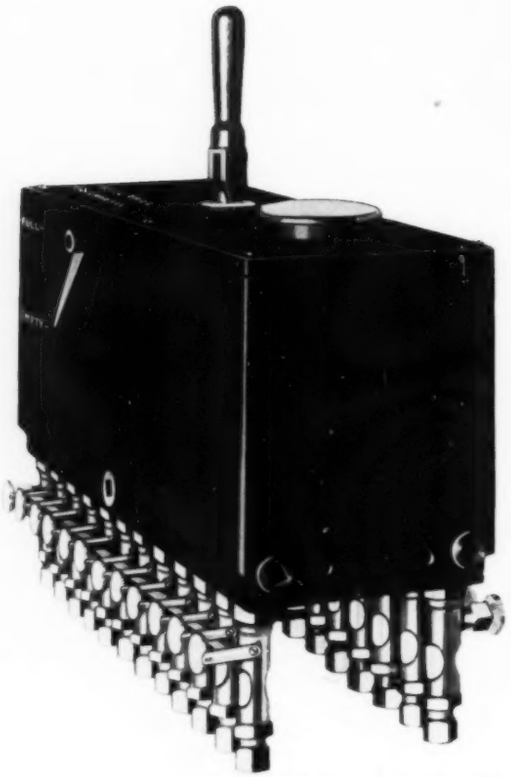
The solid adjustable diehead announced by the Eastern Machine Screw Corp., New Haven, Conn., makes it possible for manufacturers who are accustomed to using solid dies of various types to take advantage of the low cost and accuracy of the insert chaser. These tools use the same insert chasers as are used in the regular line of "H & G" insert-chaser, self-opening dieheads. These tools have only about one-quarter of the weight of corresponding self-opening dieheads and are available in three sizes as follows: 0–$\frac{1}{2}$ in.; $\frac{7}{16}$–$\frac{3}{4}$ in.; and $\frac{11}{16}$–1 in. Larger sizes in $\frac{1}{4}$-in. steps can be made to order.

Gits Brothers Oil Tank and Multiple Oiler

The automatic multiple oiler for frequent lubrication, announced by Gits Bros. Mfg. Co., Chicago, Ill., may be actuated by hand, air, electric motor or moving part of a machine. Where a shop is equipped with air and a pneumatic oiler is desired, only 30 lb. air pressure is necessary to operate the oiler. A Telechron operates the electric multiple oiler every 15, 20, 30 and 60 min. Adjustment for the amount of oil, from one to ten drops, is made through the adjustment screws on the face of the box. These oilers can be adjusted to meet any lubrication requirements, for high or low speed. In cases where three or four oilings per day are sufficient, it can be hand operated.



Telechron clock operates this multiple oiler at intervals of 15, 20, 30 and 60 minutes



This sight drip oil tank comes in two sizes. One has from 1 to 12 leads, the other has from 1 to 24 leads

The oiler is placed above the bearings and the opening in each lead is above the oil level in the reservoir. The height of the openings is adjusted by screws on the ouside of the oiler. When the oiler operates, the oil cups rise out of the oil well to a fixed position, delivering oil to the openings. Cups drain varying quantities of oil from ¼ drop to ten drops, depending upon the adjustment. Heavy or light oil will feed equally well.

Oil Tank with Sight Drip Fittings

The oil tank with sight drip fittings announced by the Gits Bros. Manufacturing Co., 1846 Kilbourn Ave., Chicago, Ill., is available in two sizes. These have 1 to 24 leads and 1 to 12 leads. The main valve permits shutting off all leads. The body of the tank is made of aluminum. Oil gage is provided for convenient checking. Sight drip fittings are provided with a locking needle valve to adjust each lead to feed the oil required.

Oil line tanks are tapped on both ends and sides with ½-in. pipe-tapped holes. These openings are used to lead oil supply to distant bearings or machines. Pipes for these leads can be fitted with oil line gages and sight-feed valves close to machine to be oiled.

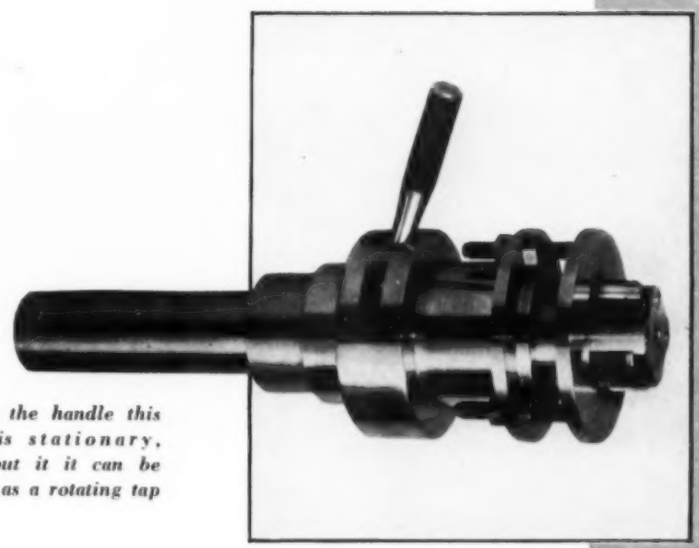
MACHINE TOOL SHOW

Murchey Universal Combination Tap

The Type "C" tap announced by the Murchey Machine & Tool Co., Detroit, Mich., is a universal combination tap which may be used as a stationary tap for hand screw machines or turret lathes, or the handle may be removed, converting it into a rotating tap to be used on a drill press or rotary spindle machine in which the tool revolves.

Chaser adjustment for size is accomplished by an internal adjustment from the front end of the tap. This adjustment allows for $\frac{3}{4}$ in. over or below normal chaser size. This makes it possible to cut oversize or undersize threads and to compensate for the loss of size due to grinding.

These taps can be equipped with overhanging chasers to cut close to a shoulder or to be used in a blind hole. They may be constructed to include boring, reaming and chamfering tools and with any type of pilot desired. Standard collapsible taps are made in all sizes from 1¼ to 1½ in. Special taps with extra long bodies can be furnished to cut extra long threads.



With the handle this tap is stationary, without it it can be used as a rotating tap

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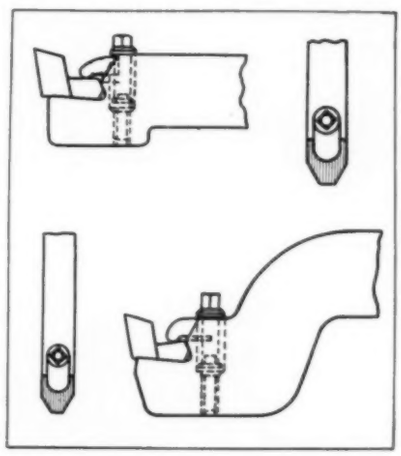

The angular mating surfaces on the bit and in the holder relieve the strain on the locknut

O. K. Shankless Toolbit

An adjustable shankless toolbit and holder, announced by the O. K. Tool Co., Inc., Shelton, Conn., incorporates many of the firm's milling cutter features. It has the economies and advantages of the inverted type of tool, but the strength and solidity of the solid tool. The toolbits are of high-speed steel; the holders are of chrome-nickel alloy. Both are drop forged and heat-treated.

By tightening the locking clamp the toolbit is locked back against the rear angular mating surface and downwardly interlocking into the bottom angular serrated mating surface in the holder. The combined angular mating surfaces on the toolbit and in the holder eliminate any sidewise or lengthwise tipping of the toolbit that may be created by the cutting action.

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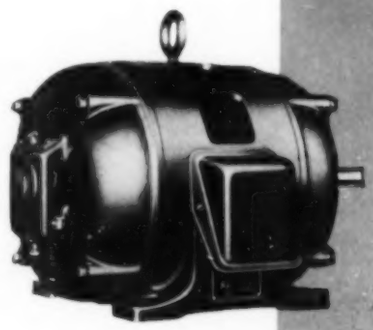
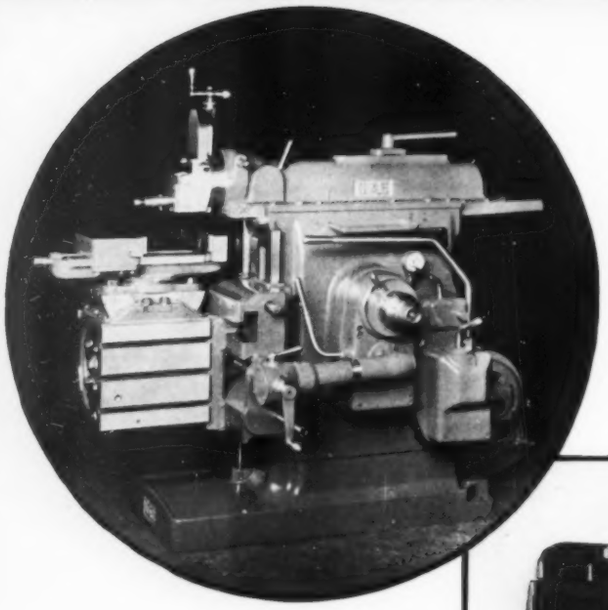
Century Special Machine Tool Motors

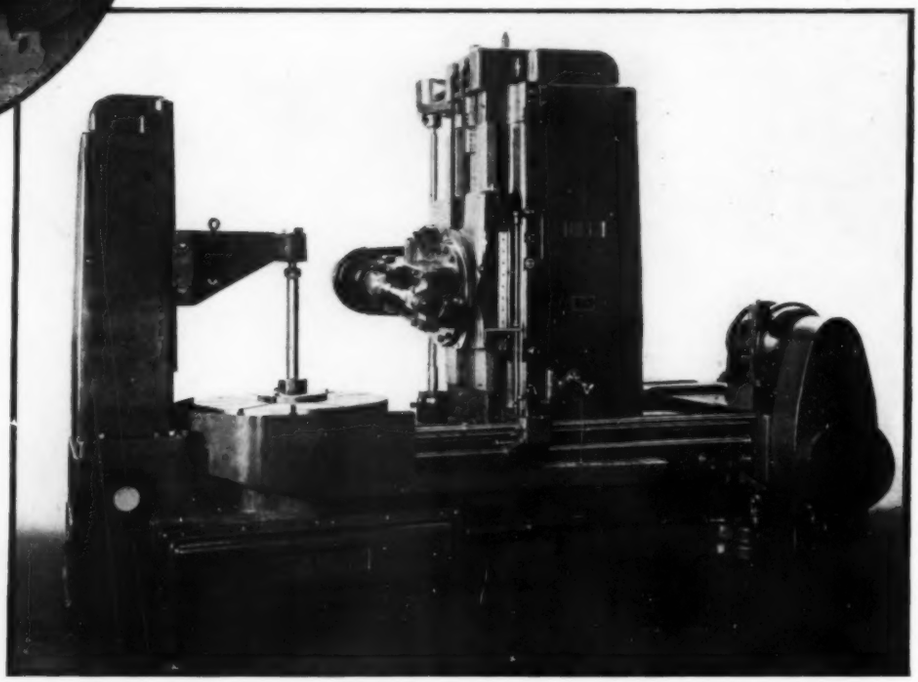
Squirrel-cage, normal-torque and high-torque motors especially designed for such applications as machine tools, will be exhibited by the Century Electric Co., St. Louis, Mo. Special attention has been paid to mechanical stability which has been found essential to the successful operation on this type of application. The construction includes cast frame and end brackets, large-sized shafts and bearings and well-anchored field and rotor cores. Sturdy electrical connections and wiring are used. These motors are available in sleeve or ball-bearing designs and in sizes 600 hp. and smaller.





Low working height and concentration of controls facilitate operation of this shaper without sacrificing its range

Suitable for rapid production of spur, single and double helical and worm gears, this hobber uses the vertical cutting principle



Gould & Eberhardt Toolroom Shaper and Hobbing Machine

A universal manufacturing-type gear hobber and 14- and 16-in. shapers have been developed by the Gould & Eberhardt, Newark (Irvington), N. J. This machine, the No. 72-H, is suitable for rapid production of spur gears, single and double helical gears, and worm gears. It has capacity to cut gears up to 48 in. in diameter within the support and 80 in. in diameter with the support removed. The face capacity for spur gears is 20 in., and the rated pitch capacity is 1½ D.P. in steel. Net weight, 26,000 lb.

Characteristic of G&E gear hobbers, this universal machine uses the vertical cutting principle with the hob slide mounted on an adjustable stanchion and the work spindle fixed within the base. The hob slide travels on double rectangular guides having four independent adjustments. The stanchion is adjusted along the base for the depth of tooth and for diameter of gear to be cut. The swivel cutter support has an angular adjustment of 180 deg. to cut right- and left-hand helical gears.

A bronze tapered sleeve is shrunk on the alloy steel hob spindle and rotates within the hardened steel bushing. This construction retains the coaxial rotative center of the shaper spindle within its bearing. Independent adjustment means maintain the respective diameter and end fits of the hob spindle. Power rapid traverse moves the hob slide rapidly in either direction, and may be operated with the cutters and work spindles rotating or at rest.

A differential mechanism for cutting helical gears is built directly into the machine to correlate the work-rotating and cutter-feeding mechanisms. An automatic infeed mechanism is also incorporated for automatically hobbing single- and

MACHINE TOOL SHOW

multiple-thread worm gears by the infeed method of cutting. The work arbor support is of a box type with adjustable arm that can be locked in any vertical position. Motor drive is regularly furnished through a multiple V-belt or a silent chain connection.

The 14- and 16-in. toolroom shapers are built especially for tool and die work and for work of small character where speed and accuracy are of importance. The accompanying illustration shows a 14-in. plain toolroom universal shaper arranged with a swivelling table having a tilting top. Low working height and concentration of controls without sacrifice of range or cutting ability are features of the machine. Range of strokes is from 12 to 165 and 15 to 200 per min., depending on the style and size of machine.

Automatic crossfeed to the table is operated by a single cam synchronized with the return stroke of the ram. Sixteen changes of feed from 0.0006 to 0.100 are available. The tool head is arranged with a single control head lock for any position. Because the rail clamp is concentrated on the operating side of the machine, the operator does not have to go to the opposite side of the machine when adjusting the work table in any vertical position.

The crossrail is arranged with a single plate and narrow guide for the table slide, because this structure deflects only one-half the amount of a conventional type crossrail. Transmission gears slide on multiple-spline shafts mounted in Timken bearings. Direct-connected drive on the motor by either chain, multiple V-belts or gears may be had. The universal table can be swivelled 180 deg. and the tilting work surface adjusted 15 deg. in either direction.

The illustration shows a machine without the extension base and support, but this feature is available on the 16-in. size. An adjustable stress block operated in conjunction with the support forms a positive lock which prevents any slippage of the clamping bolt.

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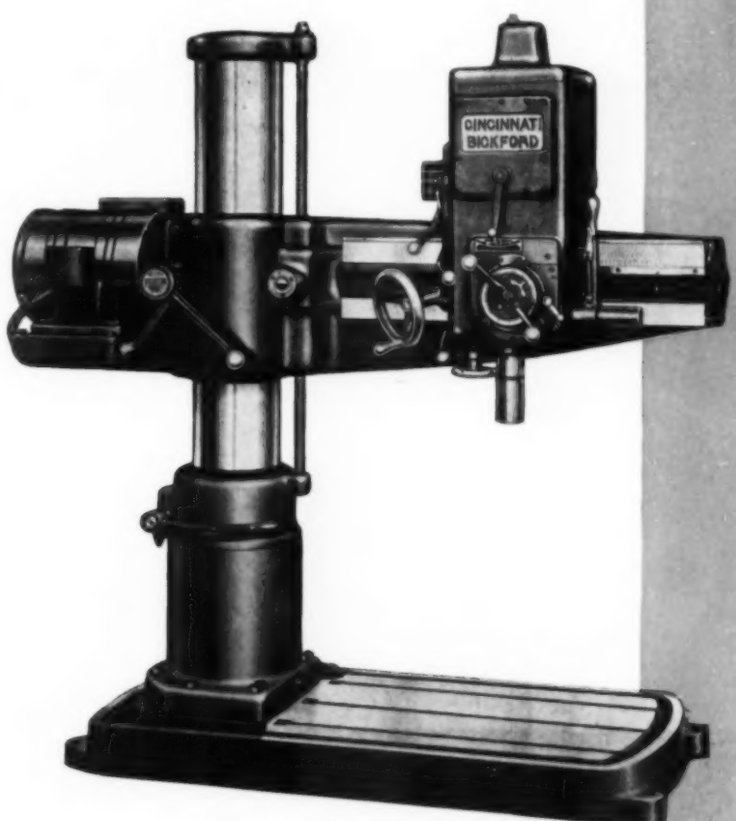
"Super Service" Radial Drilling Machine

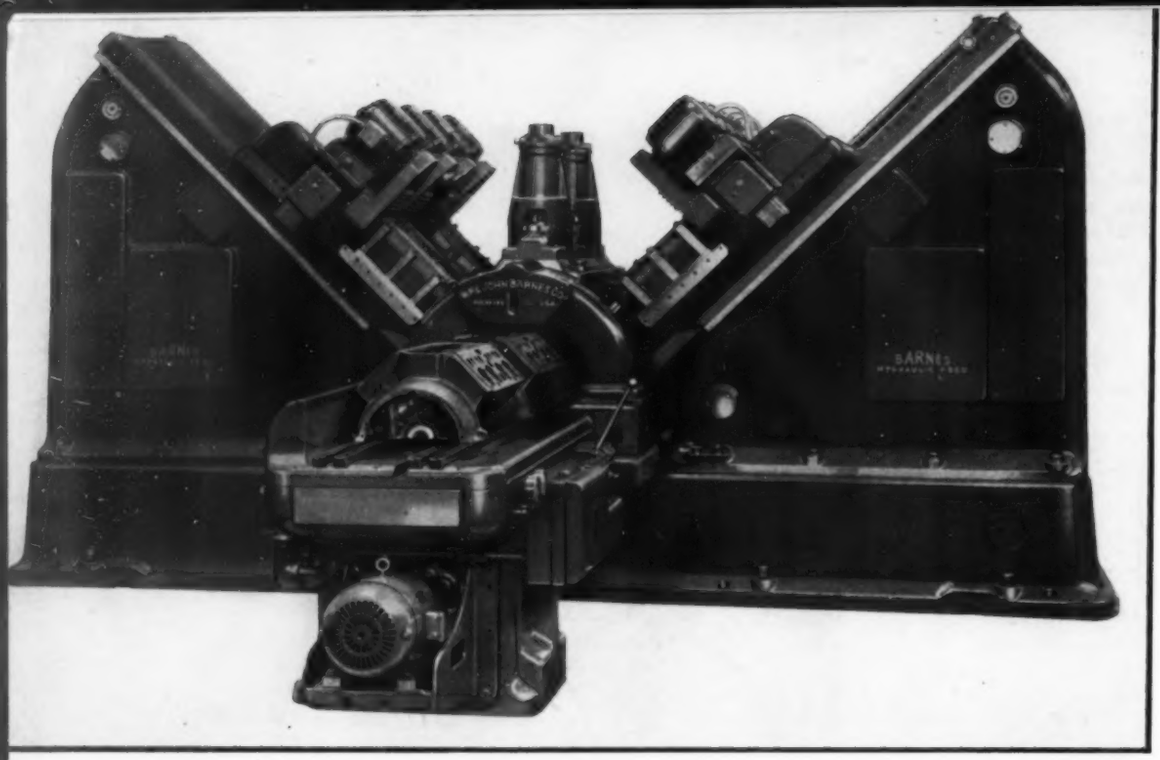
The high-speed "Super Service" radial, offered by the Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio, provides spindle speeds as high as 3,500 r.p.m. without the use of belts. All speed changes are made at the head through alloy steel sliding gears. Nine spindle speeds are available and are controlled by a single lever. An option on any one of five speed ranges which best fit the requirements is offered. Two feed ranges, made through sliding gears in the head and controlled by another single lever, are optional. All shafts are of the multiple integral-key type; no inserted or single keys are used. The arm may be provided with power elevation, conveniently controlled by a single lever which is also used to clamp and unclamp the arm to the column. Automatic safety stops are provided at the top and bottom limits of the arm travel.

The head is mounted on anti-friction bearings, rolling on a hardened steel arm-way, and is moved at the rate of 3 in. per turn of the handwheel. The feed engagement clutch is of the positive type which will not slip at any point. Automatic disengagement of the power feed is governed by setting the graduated dial depth gage. Power feed is automatically disengaged at the top and bottom limits of spindle travel.

Spindle and sleeve are counterweighted for rapid operation. For accuracy and rigidity, the spindle sleeve bearing at the bottom of the head is exceptionally long. The feed rack is an integral part of the spindle sleeve.

A distinctive feature of this machine is the fact that no forward or reverse spindle driving clutches are required. They are eliminated by the use of a reversing motor. The lever at the lower left of the head operates built-in pushbuttons, and thus controls the forward and reverse rotation and stopping of the spindle. All wiring and electrical equipment is furnished as standard equipment.





Two Ford V-8 cylinder blocks are machined per cycle on this finish boring machine. Each boring spindle is individually driven by its own motor and V-belts

Barnes Finish-Boring Machine and Hydraulic Feed Units

THE machine illustrated was designed and built by W. F. & John Barnes Company, Rockford, Ill., for the final finish boring of Ford cylinder blocks. This machine and its work-holding fixture are completely automatic throughout. It was built for final finish single-point boring of blocks and does away with the reaming and rough honing ordinarily employed. It produces straight and round holes, and requires only a few strokes of a finish hone to produce the desired finish. Accuracy of machining is obtained through the Barnes system of hydraulic units, valves and controls so tied in with the electrical equipment and motors that all mechanisms are controlled by one mechanism.

To put the machine in operation the control lever is moved to the loading position. Two cylinder blocks are drawn into the fixture from the loading station by an hydraulically operated pull bar which also unloads the fixture after the boring operation. The control handle is then moved to the starting position which raises the locating pins that engage the dowel holes in the bottom of the block. Simultaneously the clamping cylinders in the top of the fixture lock each block securely in place and the machine starts through its automatic cycle. Slides carrying four boring units, each driven by V-belts and individual motors, move in rapid traverse until the boring spindles reach the boring position. Because of the close center distance of the bores the bars bore alternate holes in both blocks at each operation.

Control dogs on each slide advance the boring units to the feeding position for the boring of the cylinders. At the end of the feed stroke another

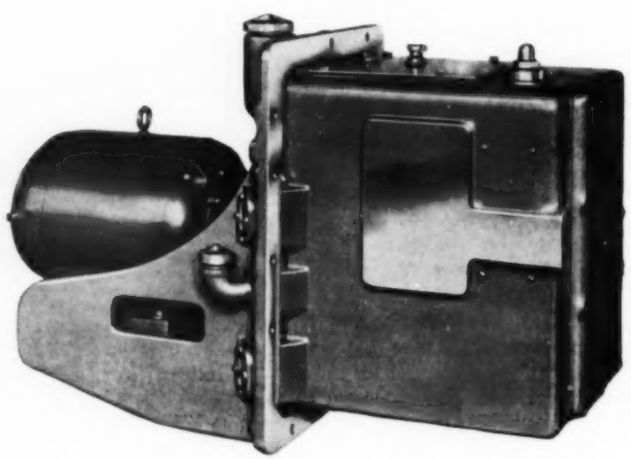


Fig. 1—Flange-type unit for manifolding to a cylinder or piping direct to a cylinder

dog on the slide actuates a limit switch which in turn operates the mechanism for stopping all spindles with the boring tool in the proper position. The fixture is then automatically shifted 0.016 in. away from the work, so that spindles may be withdrawn without contacting the finished surface. Slides are then returned to the starting position.

After the slides have been returned to the starting position the fixture is automatically indexed by hydraulic means for the necessary distance between the holes in the block so as to bore the next four holes. The cycle is then automatically repeated as described.

When the slides return to the starting position after the second boring operation, the control handle is moved to the unloading position. Locating pins are withdrawn, clamping cylinders release the blocks and the hydraulic pull bar pushes the two finished blocks out of the fixture and pulls in two more. The machine is then ready for another complete boring cycle.

The boring spindle speed is 520 r.p.m. with a feed of 0.007 in. Approximately 0.015 to 0.018 in. stock is removed in the finish boring operation. All cylinder bores are held to 0.0002 in. limit for size.

Fig. 2—Unit for hydraulically indexing a fixture in relation to the boring spindles

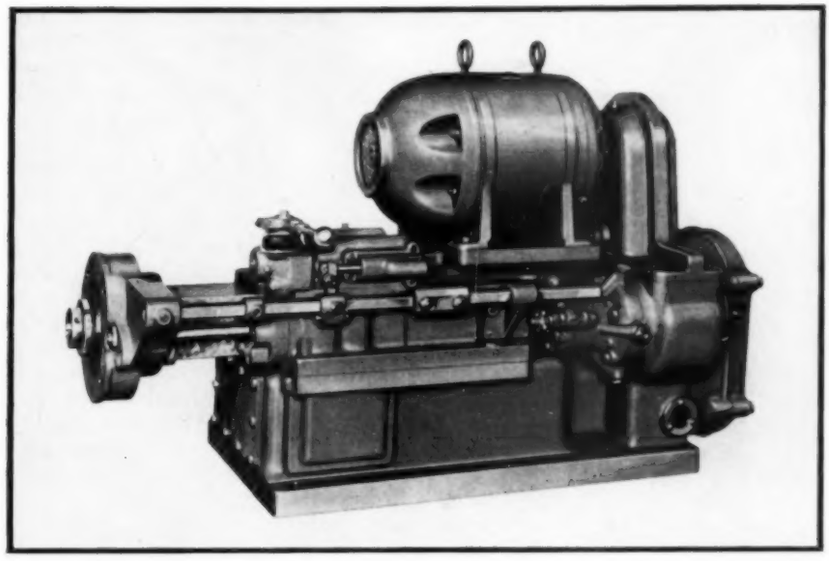


Fig. 3, above—Type FT unit for operation of boring and drilling heads and intended for mounting on a bracket at the rear of the machine. Fig. 4, left — Square - ram, 3-hp. unit offered for work not requiring the heavy-duty hydraulic heads

Life of the single-point boring tools is approximately 800 holes per grind, because of the accuracy of hydraulic feed. Hydraulic feed units have been designed especially for machine-tool actuation by the W. F. and John Barnes Company, Rockford, Ill. These hydraulic feed units are adapted to heavy boring and drilling operations. They provide rapid approach of the tools to the work at a fixed rate; any desired feed rate between zero and the maximum for which the cycle is designed; an accurately controlled dwell, if required; rapid return of the tools to the starting position; automatic stop, or repeat. A constant ratio between the feed rate and the revolutions per minute of the cutting tool is maintained under all operating conditions, including heavy interrupted cuts. Because the temperature of the oil remains close to that of the surrounding atmosphere, the life of the oil in the circuit is prolonged, even in heavy duty service. These features are secured through two pumps and one control valve which were designed by Barnes. Units are connected with a minimum of piping, joints or passages, and have a closed hydraulic circuit from which the air is eliminated.

The flange type unit may be adapted for manifolding direct to a cylinder or may be piped direct to a valve and cylinder with a minimum of piping. An indexing unit is for hydraulically indexing a fixture in relation to the boring spindles.

FT Type Unit is used principally for the operation of boring and drilling heads. It is usually mounted on a bracket at the rear of the machine and controlled by the necessary valve, according to the work being performed. The 3-hp. hydraulic square ram unit is designed for work that does not require the heavy duty hydraulic heads. This unit can be incorporated in existing machines or in the manufacturer's designs. These drill units can be operated in any desired position or at any angle, and can be used in combination with independent or centralized control. A 5-hp. hydraulic square ram unit is also manufactured.

The hydraulic mechanisms responsible for the operation of this machine are on exhibition, but of course the machine itself is at work at the plant of a prominent automotive manufacturer.

A newly designed optical system provides images free from distortion and with magnification accurately rated on the lens system

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Bausch & Lomb Contour Projector

Among the optical instruments which Bausch & Lomb Optical Co. will display at the show are two contour measuring projectors. The four objectives provided with the large projector gives powers of 10, 25, 50 and 100 times, whereas the small instrument uses objectives of 25, 50 and 100 times. All objectives are interchangeable and so adjusted and coordinated that the act of replacing one or the other gives an image of the exact magnification rated on the lens system. This not only adds to convenience but eliminates the tedious operation of adjustment for magnification with each change of lens, with the consequent risk of error in measurement. The correction of the objectives for equality of magnification over the entire field, from center to margin, to such a degree that differences cannot be detected by any ordinary methods, has been accomplished.

The smaller projector is provided with a vertical translucent screen upon which the outline of an object may be traced, and an opaque horizontal screen, formed by a small retractable drawing board, upon which paper or original drawings may be attached. The image may be changed from one screen to the other by shifting a small slide. The translucent screen may be replaced by a photographic plate or by a pair of plate glasses mounted in a book-form frame, between which original drawings on tracing cloth or tracing paper may be placed.

Several types of screens are provided with the large projector. It is also equipped with a goniometer chart with a large circular screen inscribed with index lines. The vernier scale may be read to a single minute of arc under poor light

conditions. The work table for the large instrument is horizontal, located below and to the front of the screen convenient to the operator's hand. The work table moves vertically for focusing or to accommodate objects varying in thickness; it is placed horizontally and to the front of the screen. Its horizontal position permits rapid and accurate manipulation of the object to be projected. A pair of lamps is adjusted integrally for the illumination of objects to be projected by opaque illumination. The light source for both projectors is inclosed. This offers protection from abuse and prevents light leakage. A convenient door permits replacements and adjustments.

Among the accessories supplied with these instruments is a measuring table by which objects in the plane of projection may be measured in two dimensions to an accuracy of one ten-thousandths of an inch. This table may also be inclined for the precise measurement of the constants of screw threads. A pair of centers for cylindrical work, a pair of studs for the study of gears, and other special devices that increase the adaptability of the instruments are provided.

The bases of the instruments are provided with a cabinet and drawers for the storage of the objective lenses and accessories, as well as screens, when these parts are not in use.

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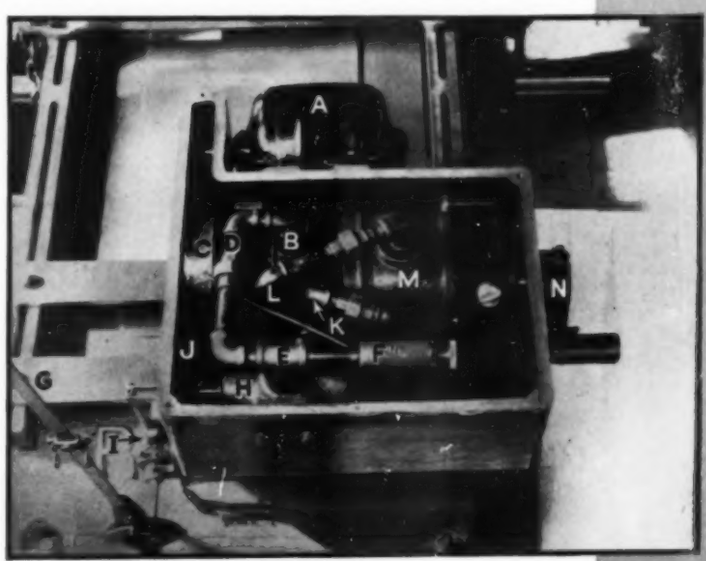
Hydraulic Control for Reeves Transmission

The "Hydraumatic" hydraulic automatic control for its variable-speed transmission was originally developed by the Reeves Pulley Co., Columbus, Indiana, to meet requirements for a control which would operate from a very light pressure on the indicating lever and would eliminate all "hunting" action. A pressure of only two or three ounces, moving the extended lever a very small fraction of an inch, will bring about variation in speed. Because of the elimination of backlash, there is no "hunting" tendency.

The control is actuated by an indicating lever attached by cable, arms, link or chain to a compensating or floating roll, pressure regulator, float, moving part of the machine or any other element from which indication of the required speed can be taken. This lever is attached to one of the shifting levers of the transmission through a differential mechanism and vertical and horizontal rods. Thus, movement in lateral direction of the indicating lever is transmitted to the shifting levers which vary the diameters of the disks and V-belt, increasing or decreasing speed.

Referring to the illustration, the driving motor *A* operates a geared pump *B* through sprocket and roller chain under the splash guard *C*. Facing the shaft end, the motor must run counter-clockwise. The inclosure which houses the operating parts is filled to about one-quarter depth with oil. Oil is taken up through a suction pipe by the geared pump and is forced under pressure through the pipe *D*. When it reaches pipe *T*, it can take one of two directions. If the extended lever is in neutral position, the oil will flow into the relief valve *F* from which it is discharged into the tank. In this case, no rotation in either direction is transmitted to the shifting screw. If the extended lever *G* is moved about its pivoting point, either to increase or decrease speed, the oil will flow from the *T* into a two-way valve *H*.

When the extended lever is moved to left or right, the differential mechanism *I* operates to move the valve rod *J* in or out, thus providing pressure in the two-way valve, causing the oil to flow through the lines *K* or *L* into the fluid motor *M*. This motor is connected to the shifting screw of the transmission by sprocket and chain. It will actuate the transmission to increase or decrease speed depending on which way the extended lever is moved. Two tension springs on the extended lever act as a safety device, which prevents any possible damage to the operating parts of the control if the lever is shifted suddenly or violently.



Because of total elimination of backlash or lost motion, there is no "hunting" tendency in reaching the desired speed with this control

The spindle of the Abrasive horizontal reciprocating surface grinder is driven by an endless woven belt without a tightener

Abrasive No. 3B Reciprocating Surface Grinder

The No. 3B horizontal spindle reciprocating table surface grinder just introduced by the Abrasive Machine Tool Co., East Providence, R. I., has a longitudinal capacity of 24 in., a transverse capacity of 8 in. and a vertical capacity of 12 in. In each case the total movement is somewhat greater than the figure given. The chrome steel hardened, ground and lapped spindle is $1\frac{5}{8}$ in. in diameter, has a taper nose and is carried in a phosphor bronze box at front, adjustable for wear, and in super-precision ball bearings at the rear. The whole assembly is mounted in a removable cartridge type housing. The normal spindle speed is 2,290 r.p.m., and the spindle is driven by an endles flat belt without a belt tightener.

A 10-in. diameter by $\frac{3}{4}$-in. thick wheel, with a 3-in. hole is standard, but larger diameters will be furnished on special order. The two table speeds are 20 ft. and 40 ft. per min., and the change from one to the other is made with a push-pull knob at the front of the gear box. The feeds are automatic in longitudinal and transverse directions, and are controlled by adjustable dogs on the table and saddle and by safety dogs to prevent damage. The wheel slide is provided with one hand wheel graduated in $\frac{1}{4}$ thousandths for fine feed and one with a 3-to-1 ratio for quick movement. The transverse feed hand wheel has a micrometer adjustment with a dial graduated in thousandths. The table hand wheel is provided with automatic lockout so that it will not revolve when the power feed is thrown in and cannot be engaged. A built-in oil shock absorber in the gear case cushions the shock of table reversal. The automatic cross feed is adjustable from 0 to 0.070 in. at either or both ends of the table stroke.

Drive is either by countershaft or by motor. The only motor required develops 3 hp. at 1,750 r.p.m. A standard magnetic starter with pushbutton control is used and the motor is direct-connected to the main drive shaft by a flexible coupling.

Either a dust exhaust attachment or wet grinding attachment is available for use with this machine. Both attachments can be furnished on the same machine whether or not it is equipped with generator or motor or both. The wet grinding attachment consists of table guards, wheel hood, connections, movable tank, and motorized centrifugal pump.

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Gallmeyer & Livingston Surface Grinder

The No. 65 hydraulic feed surface grinder illustrated is not only the latest addition to the line built by the Gallmeyer & Livingston Co., Grand Rapids, Mich., but also the largest. The table has a working surface of 12x48 in., and the longitudinal and transverse movements are sufficient to enable the operator to cover the entire surface of the table with a 12x1-in. grinding wheel which is standard equipment. The maximum distance from wheel to table under the full 12-in. wheel is 17 in., and the vertical movement of the wheel head is 18 in.

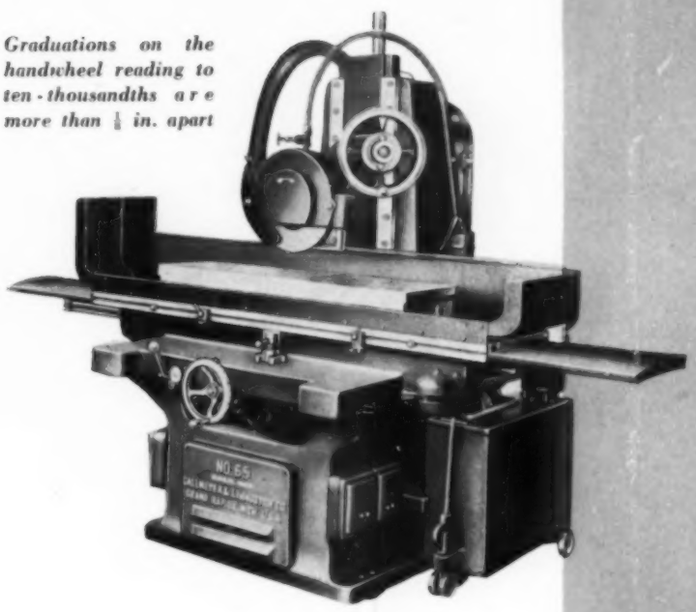
This machine is built around a rigid, one-piece column and base casting, a construction chosen to secure maximum rigidity and the permanence of alignment between the vertical head ways and the cross travel ways. A Vickers vane-type hydraulic pump and relief valve together with the 3-hp., 1,200-r.p.m. motor directly connected to it by means of a flexible coupling, are mounted on the cover of the oil reservoir and inclosed within the column. All belts and chains are eliminated from the hydraulic mechanism which is inclosed inside of the column, but is, nevertheless, conveniently accessible from either the front or the rear.

The maximum longitudinal speed of 125 ft. per min. is provided and is controlled by a small hand wheel conveniently located on the front of the saddle. A separate start and stop lever is located closely adjacent. The cross feed is automatically

operated and may be set so as to operate at each reversal of the reciprocating table, or at one end of the stroke only. The amount of feed is adjustable and can be set to feed either in or out, as desired.

The spindle is mounted in selected preloaded ball bearings and is of extra heavy construction. A large hand wheel is provided for raising and lowering the wheel head through a worm and gear. The hand wheel is graduated in quarter thousandths with a movable pointer which can be set for convenient readings. When it is desired to get very accurate readings for grinding to close limits the smaller hand wheel or knurled knob in the center of the large hand wheel provides a back-geared action. The disk in the center of this hand wheel has a graduated dial which can be set at zero in relation to the pointer mounted on the spoke of the large hand wheel. Both the inner and outer wheels turn, but the graduations on the inner wheel are arranged to read on the moving point giving a Vernier effect. With this arrangement readings of tenths of a thousandth are possible with the ten-thousandth graduations over $\frac{1}{8}$ in. apart.

All bearings and working surfaces except spindle bearings are lubricated by a one-shot oiling system. Two spindle speeds are available through a V-belt drive from a motor mounted on an adjustable bracket to the grinding wheel spindle. Thus, one speed which is just right for the full turning wheel is available and a second and higher speed to be used after the operator has accumulated wheels that have been worn down to a diameter of 7 or 8 inches.



Graduations on the handwheel reading to ten-thousandths are more than $\frac{1}{4}$ in. apart

Alternatively, the machine can be equipped with a 3-hp., 1,750-r.p.m., 60-cycle motor, mounted directly on the spindle. This particular speed happens to be satisfactory for a standard 12-in. wheel. A portable, self-contained motor driven coolant system is provided, and also a self-contained, motor-driven, dust-collecting system of the machine tool type.

All-electric, with the New Departure Transitorq drive, this threading machine is decidedly flexible

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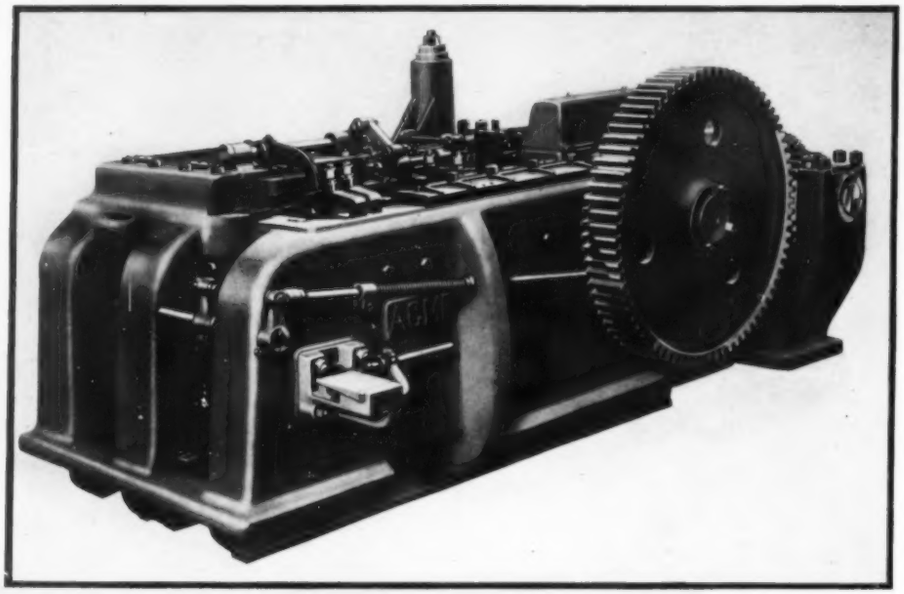
"H. & G." Threader

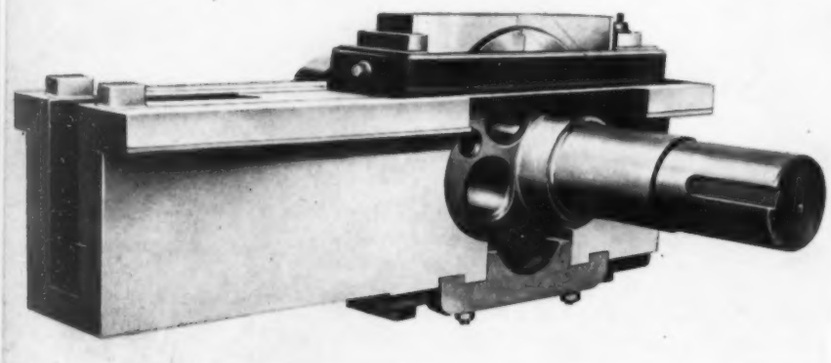
The Model 2 H&G threader illustrated has been introduced by the Eastern Machine Screw Corporation, New Haven, Conn., to supplement the standard H&G threader. It is capable of handling larger work and the bed of the machine provides much larger chip space. It is so designed that various types of tail stocks or slides may be used to accommodate various types of second operation or chucking work.

The spindle is hardened and ground and the clearance on the machine is sufficient for the die heads up to a capacity of 2 in. The machine illustrated is all electric and is equipped with variable speed drive. This variable speed is obtained by mounting a New Departure Transitorq unit in the base, which drives direct to the spindle through a silent chain, no gears being used in the combination. A constant speed electric pump maintains uniform flow of cutting oil through the die head spindle, regardless of the spindle speed.

The machine may also be ordered for countershaft drive with gears for three speeds or with simple motor drive and with three speeds.



Left — Cushioned friction drive eliminates shock on the flywheel and other moving parts. The machine is double backgeared for greater power. Below—The main shaft is of the eccentric type and has a large bearing in the header to give low unit bearing pressure



Acme No. 35
All-Steel Forging Machine

The Acme Machinery Co., Cleveland, Ohio, has produced an all-steel forging machine which features a friction cushion drive. With this type of drive, a slight pressure on the foot treadle starts the machine quickly and smoothly. In the case of overload, this clutch cushions the shock on the flywheel as it stops and relieves strain on the crankshaft and other parts. There is no backlash as the heading tool has positive movement to and from the work. This permits the metal to flow uniformly and eliminates tendency for the crank, after passing center, to recede ahead of the driving member.

The clutch disks are made of aluminum alloy because of its high conductivity of heat. These disks are cored to permit a constant flow of air through the center, keeping the clutch temperature low during the entire operation. The clutch and brake on the smaller machine, 2 in. and under, are mechanically operated by means of a single cam. On the larger machines, 2½ in. and up, the clutch and brake are air-controlled through a single piston. The air-controlled clutch facilitates die setting as it permits inching the machine slowly through the entire cycle.

Construction of the three large main crankshaft bearings is such that when the caps are bolted in place it forms a straight line bed and lessens the possibility of spring. The main shaft is an alloy steel forging, heat-treated. Being an eccentric type, it permits a large bearing area in the sliding head which results in low pressures per square inch. In this design the main shaft bearings are located closer to the center line than is possible with the conventional crank-type shaft. This construction, together with the solid eccentric, eliminates crankshaft deflection under heavy stresses.

Acme machines are double backgeared with outboard bearings for most of the trunion shafts. This double backgearing gives a much greater gear ratio between the crank and flywheel with its resultant power increase. Header slide is of the full suspended type, with the horizontal surfaces in a single plane suspended both sides of the shaft. An adjustable taper gib is provided to take up any wear both on the vertical flat sliding head surfaces and the large eccentric bushing.

It is claimed that the sliding head movement for operating the header slide has the following advantages: Increased power; eliminates the pitman movement with its frequent failure; when heading tools are placed above center line of the shaft there is no tendency for the front end of the header slide to lift up or for the rear end to raise when tools are located below the center line of the shaft; the adjustable taper gib permits taking up all play on the large flat sliding head surfaces.

The movable die slide is made of steel and has the same suspended-type slide features as the header slide. It is cradled in a hardened and ground plate attached to the movable die slide and operates against a breast plate. This permits adjustment of movable die, longitudinally, when necessary, to match the position of the stationary die and eliminates wear between the movable die and the breast plate.

MACHINE TOOL SHOW

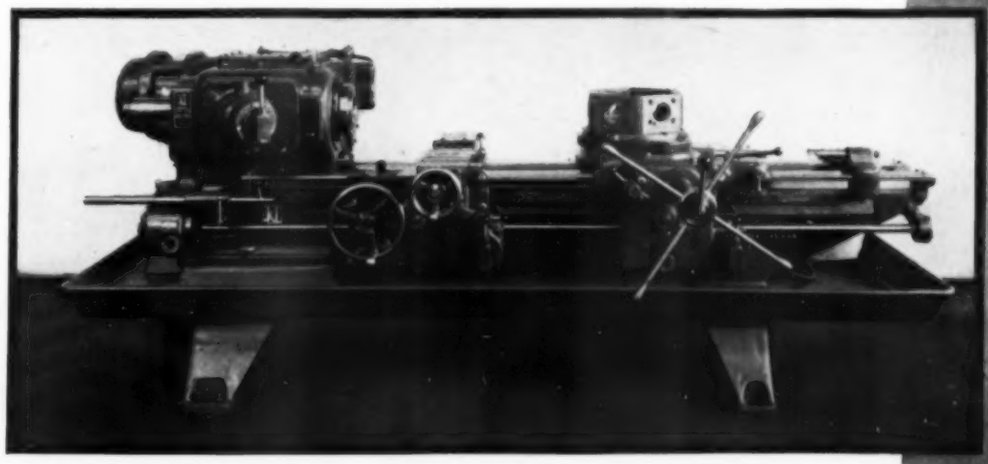
Jones & Lamson
Saddle-Type Turret Lathes

The saddle type turret lathes announced by the Jones & Lamson Machine Co., Springfield, Vt., are built with a 2½-in. bar capacity and are fitted with 12-in. chucks when used for chuck work. Single lever speed and feed selectors are provided with direct-reading dials. There are twelve spindle speeds forward and reverse. All variable speeds are obtained through sliding gears mounted on multiple-splined shafts. The main spindle is the flanged type, with a taper pilot, and is mounted on pre-loaded anti-friction bearings. All wiring for the machine is built into the headstock with the control panels located near the operating position.

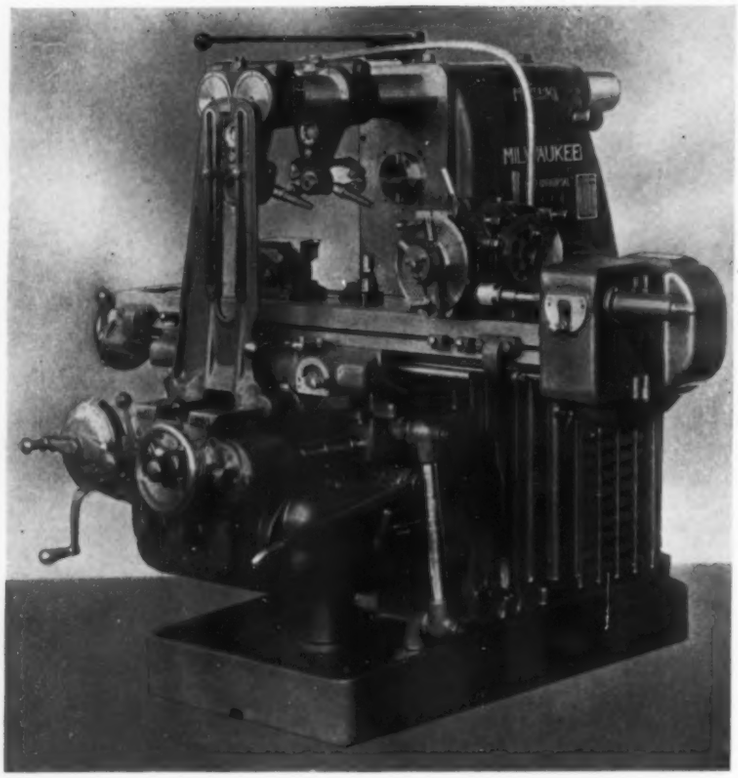
The universal carriage is equipped with a heavy-duty slide for mounting tools on the front and back. It has a spool stop for all longitudinal movements and for the cross feed, which will disengage the feed in either direction. The apron is equipped with a sliding-gear transmission of nine variable feeds, ranging from 0.005 to 0.100 on the longitudinal travel, and from 0.0025 to 0.050 on the cross travel. Thread chasing or taper turning attachments can be installed on this unit.

The bed is of double box ribbed construction and is equipped with hardened ways. The ways are a continuous hardened piece running the full length of the bed and bolted into position against aligning shoulders with vertical and angular bolts spaced 4 in. apart. These ways are so designed as to provide the bearing for the saddle and carriage on the top of the ways and the alignment against the vertical side of the front way. All hold down gibs are clamped against hardened surfaces. The ways are covered the full length with stationary one-piece steel covers that pass through the carriage and the saddle.

A six station hollow hexagon turret is located by a large taper locking pin and held in position with an automatic clamp ring. The saddle is equipped with a power traverse that is arranged to provide for two speeds in both directions. The higher speed is used for the longer travels, such as to and from the work, and the lower speed is used for short approach to the work and power indexing the turret. This speed is automatically reduced on the return stroke when it reaches the indexing position. All movements of the power traverse are controlled by lever located in the center of the star wheel, and when the power traverse is engaged, the star wheel is automatically disengaged. Six automatic stops are provided, one for each position of the turret and three additional manually-operated auxiliary stops can be selected for any one position of the turret. Three types of driving units can be supplied, flanged type motor, motor in cabinet leg with V-belt, or countershaft drive as desired by the purchaser.



By using standard units with this line of saddle-type turret lathes, four different machines can be assembled with the same bar and chuck capacities



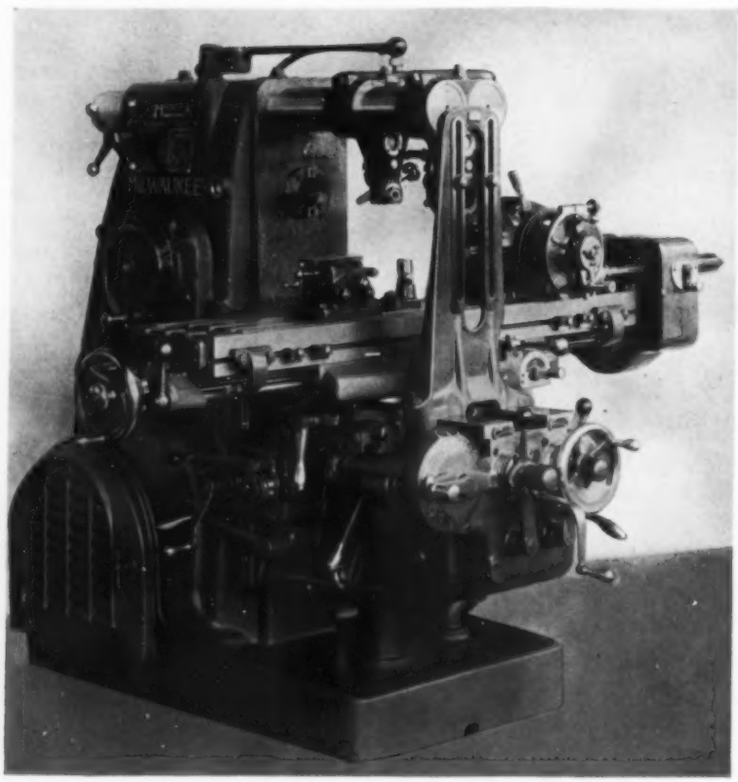
Milwaukee Models H & K Milling Machines

Designed primarily for the manufacture of small parts in large quantities such as required by small arms, screw machinery, typewriters, calculating machines and radio manufacturers, the No. 0 size of Model H manufacturing type milling machine, built by the Kearney & Trecker Corporation, Milwaukee, Wis., is almost in the midget class. The distance from the center of the spindle to the floor is only 3 ft. 8 in.

Two sizes of Model H machine are available, the No. 0 with a table 10 in. wide and a feed range of 12 in. longitudinal, 3 in. cross and 15 in. vertical, and the No. 1 with width of table 12 in., and feed range of 18 in. longitudinal, 3 in. cross and 17 in. vertical. The No. 0 model is powered by a 1½-hp., 1800 r.p.m. motor, while the No. 1 is driven by a 3-hp. motor. Both models are equipped with hydraulically controlled through feed, automatic two-way cycle and automatic spindle stop. There is an option of power rapid traverse rate for the table either at 150 in., or 300 in. per min.

Sixteen spindle speeds are available in the quick change gear box, with optional ranges of 20 to 800, 50 to 2000, or 60 to 2400 r.p.m. The entire machine is equipped with anti-friction bearings throughout, and the spindles are of the No. 40 National Standard. The 16 feeds are obtained by pick-off gears, the optional ranges being ¼ in. to 10 in., ½ in. to 20 in., or 1½ in. to 60 in. per min. The usual double overarm characteristic of Milwaukee milling machines is used on these models. The compactness and simplicity of the Model H is evident from the illustration.

Two views of the Model K Milwaukee milling machine are given to show the details on both sides of the machine. These models are now equipped with duplicate front and rear control for



Two views of the Milwaukee Model K miller show details from both sides of the machine. Duplicate front and rear controls are provided for power feed and hand adjustment

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both hand adjustment and power feed operation. For safety, there is a complete and positive interlock so that hand cranks cannot be left attached nor accidentaly revolve when power feed or rapid traverse is engaged. The Model K machines have 24 spindle speeds in one continuous series in approximate geometric progression without any speed overlapping the others. The speed selection is made at the left side of the column with a single lever and large direct reading dial. Any speed on the dial can be selected by rotating the lever clockwise or anti-clockwise. It is not necessary to run through the entire range when dropping back to a lower speed. The speed range is in a 100 to 1 ratio, from 15 to 1500 r.p.m. on both the No. 2 and No. 3 sizes in this line.

There are 32 feeds, also in one continuous series and obtained by a single lever and direct-reading dial. Feeds range from ¼ in. to 60 in. per min., and can be changed while the spindle is revolving, thus eliminating the necessity of stopping the machine when stepping up the feed another notch.

Improvements in the art of grinding and lapping gears have made it possible to substitute a spur gear drive on the spindle for the worm and worm wheel drive formerly used, and at the same time to obtain an equally quiet drive with simpler construction. The motor is mounted crosswise of the column in order to provide a solid wall column-back from overarms to floor. Drive from the motor to the initial shaft is by multiple V-belts. The main clutch has been newly located on the outside of the drive pulley so as to be readily accessible when opening the large door. An integral chip disposal trough has been cast in the rear of the knee, thereby permitting all chips to drop down to the column base. This does away with the old difficulty of having chips pile up and wedge between the saddle and column face, thus causing scoring and damage to the bearing surfaces.

The start and stop pushbutton control has been removed from the side of the column and placed directly on the adjustable starting lever. This provides a more accessible, safer and more convenient location, and makes it possible to run the wiring down inside the hollow starting lever shaft, thereby eliminating unsightly conduit.

Practically a midget, the Model H Milwaukee miller in the No. 0 size measures only 3 ft. 8 in. from the center of the spindle to the floor

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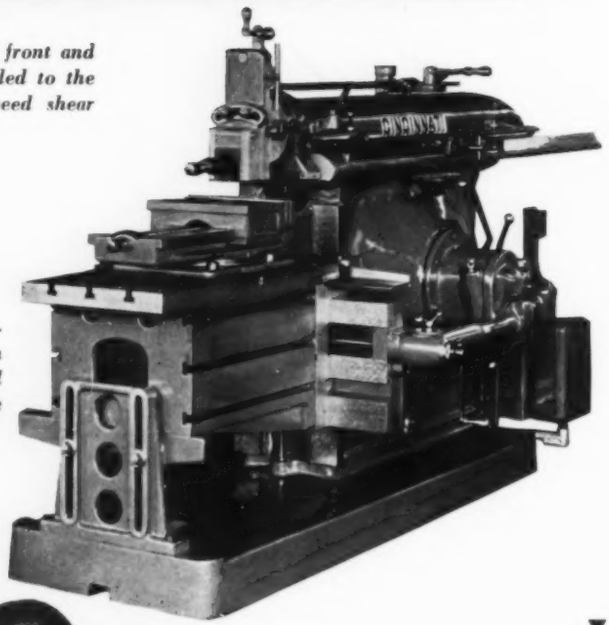
Double-Cased "Purolator" Filter

A Purolator with a double case and with a capacity based on tests with clean kerosene at room temperature under 15 lb. pressure through 0.005-in. slots of 24.8 gal. per min. is the latest addition to the line of industrial oil filters manufactured by Motor Improvements, Inc., Newark, N. J. This model is known as D-14JJ, and can be provided in series to give two stages of filtration or in parallel to increase volume.

These filters range in size from 7½ to 10 in. in width, and from 9 5/16 in. to 11 7/16 in. in depth, and are designed to operate under a maximum working pressure of 100 lb. per sq. in. The filtering slots may vary from 0.0005 in. to 0.015 in., and the surface of the element is kept clean by movable knives.

The filtering element is made by winding a ribbon of bronze, monel, stainless steel, or other metal around the metal core, or cage, that is cylindrical in shape. Small projections keep the edges of the ribbon from fitting closely and so create a series of narrow slots which comprise the filtering factor.

Automatic gaging, front and rear, has been added to the Cincinnati high-speed shear



Faster speeds, a heavier frame and an automatic tool head allow use of carbide cutting tools

Cincinnati High-Speed Shapers and Shear

A new higher speed range up to 200 strokes per min. characterizes the 16-in. high-speed shaper of the Cincinnati Shaper Co., Cincinnati, Ohio, and an extremely heavy cutting capacity is the outstanding feature of the 24-in. heavy-duty machine. Both of these shapers have the built-in power rapid traverse which has been used for some time in Cincinnati shapers, and also multiple cam feeds and automatic oiling. To these features have been added the new speed range already mentioned, increases in the size of frame members to enlarge capacity, special high-speed automatic tool heads, for using tungsten carbide tools on a reciprocating stroke, and the new finish to all levers and dials to promote easier vision.

A high-speed squaring and slitting shear with a capacity of $\frac{1}{4}$ in. by 96 in. has also been announced by the Cincinnati Shaper Co. These features have characterized Cincinnati shears for some time; hydraulic holddowns, worm and worm wheel drive, high-speed and automatic oiling. To these have been added the tilting of the upper knife bar for extreme accuracy a lowering of the rake to the knife for shearing flat strips, the addition of graduated stainless steel scales to the table, and automatic gaging front and rear. There is also a light beam shearing gage for cutting to a scribed line.

With the hydraulic hold-downs the sheet is clamped with the same pressure at the low points as at the high points. Hold-downs are independent as to clamping movement but derive pressure from the same accumulator. The plungers are located close to the knives.

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No. 521 Tom Thumb belt threader geared for National Coarse threads

Oster-Williams Tom Thumb Pipe Machines

Improvements in both the No. 512 and the No. 521 Tom Thumb pipe and bolt threading machines have been announced by the Oster-Williams Co., Cleveland, Ohio. Both machines are now equipped with a flared base for greater rigidity and for protection against the loss of threading oil.

Increased capacity now makes the No. 512 capable of covering all sizes of pipe from ½ in. to 2 in., and the machine is built with a rack and pinion feed for the die head carriage as well as a thread length indicator which enables the operator to determine the exact length of thread to be cut without looking into the die head. The machines are still available with either quick opening, adjustable die head or individual solid type head, for each size within the range.

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An outboard support for the vise carriage ways to make for still greater rigidity is an improvement in the No. 521 machine which is recommended for bolt threading up to 1¼ in. There is also a rack and pinion feed for the carriage to facilitate its operation.

Two formerly special models of the No. 521 machine are now standard. These are the Nos. 521-¾ N.C., and 521-⅜ N.C., which are geared especially to give maximum production on National coarse threads up to the sizes indicated by the catalog numbers. The former will handle National fine threads up to 1¼ in. in diameter and the latter up to ⅝ in.

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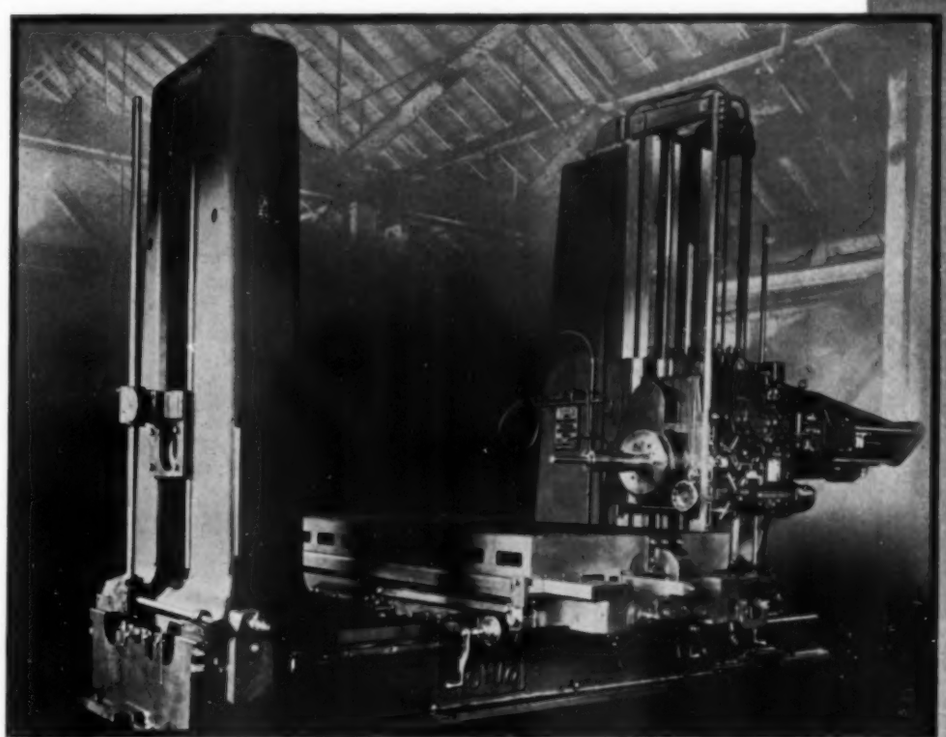
Ohio Horizontal Boring, Drilling and Milling Machine

A number of improvements characterize the 5-in. and 6-in. spindle Dreadnaught table type horizontal boring, drilling and milling machines built by the Ohio Machine Tool Co., Kenton, Ohio, and distributed by Bryant Machinery & Engineering Co., Chicago. The illustration shows a 6-in. spindle machine with 72-in. vertical travel of the spindle head, 48 by 100-in. table, 60-in. wide by 120-in. long bed. The machine is equipped with quick change gear thread chasing attachment for all threads between 2 and 28 in. threads per inch, including pipe threads. It also has precision rod measuring attachment, and a cutter coolant system. The machine has just been installed at the Cleveland Punch and Shear Works, Cleveland, Ohio, and is, therefore, readily accessible to visitors to the Machine Tool Show.

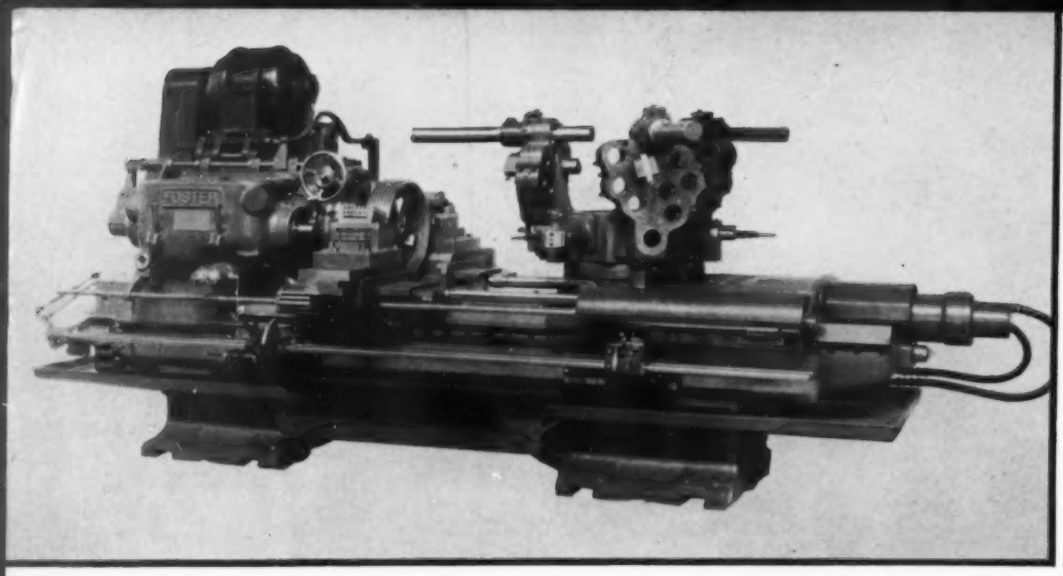
Among the important changes is the movement of the precision rod measuring attachment from the rear of the head and the rear of the table to the front of the head and the front of the table, thus bringing it to a position where it can be easily manipulated by the operator from his regular position. Also, the hand wheel for hand feed to the spindle and other units has been brought to the extreme front of the machine. It is adjacent to the rapid hand adjustment to the spindle and power rapid traverse control.

The hand movement to the table and table saddle, the clamping of the table to the saddle and the saddle to the bed have been brought to the front part of the saddle, adjacent to the operator's position. The boring bar support bearing is fully counterbalanced and can be clamped from the floor regardless of its vertical position. The head of the machine is oiled by a forced feed lubricating system, the oil being pumped through a Purolator and cleaner before it reaches any of the bearings or gears.

There are 36 spindle speeds and 16 drilling, boring and milling feeds, and the machine will take a 50-hp. motor with spindle speeds ranging from 8 to 600 r.p.m. All speed and feed changes, reversing of feeds and milling feeds control are located on the head. Hand movements to all units are equipped with micrometer dials reading to 0.001 in.



Ohio 6-in. spindle machine now has the precision rod measuring attachment at the front of the head and at the front of the table



A bridge-type cross-slide on the No. 3 indexing turret "Fastermatic" has a front and a rear slide, either of which may be used with any face of the hexagon turret

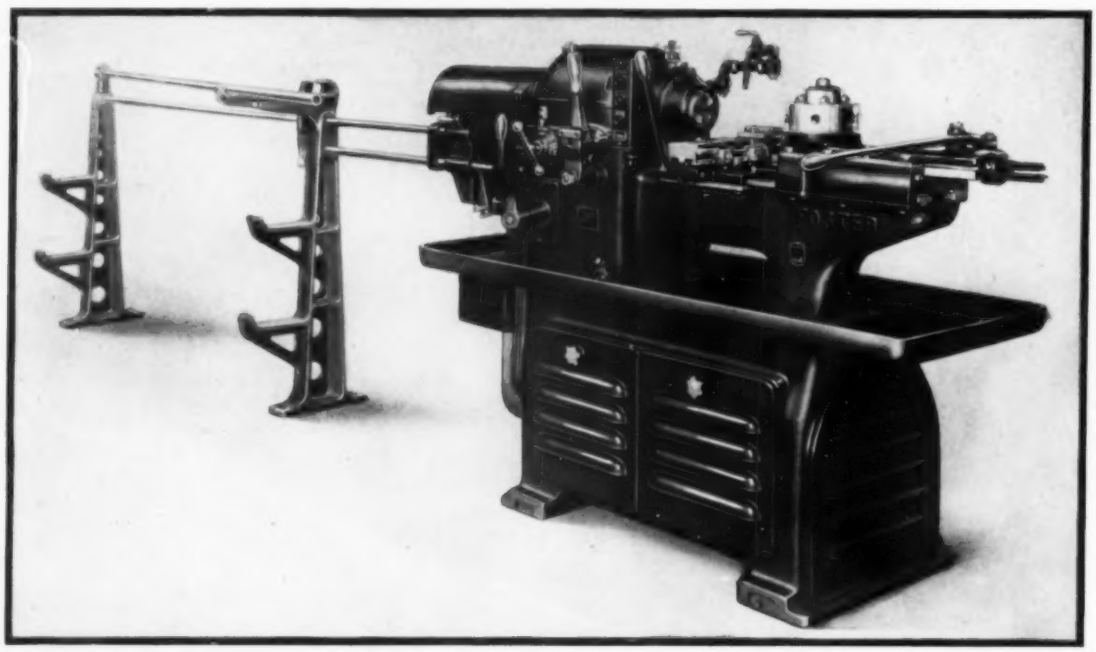
Foster No. 3 "Fastermatic" and Nos. 1 and 1½-In. Turret Lathes

A No. 3 indexing turret "Fastermatic" has been announced by the Foster Machine Co., 1100 Beardsley Ave., Elkhart, Ind. The bed is equipped with adjusting blocks for leveling and has nitrided hardened V-ways which are over 1,000 Brinell in hardness.

There are 16 changes in spindle speeds, arranged in four sets of four automatic changes. Any group of four automatic changes may be quickly obtained by the levers on the front of the machine. After the proper range has been selected, the changes are made by the forward movement of the turret unit and, if desired, four automatic spindle speed changes may be made with one forward movement of the turret, and they may be made with each face of the turret if desired.

The machine has a bridge-type cross slide with a front and rear slide either of which may be used in conjunction with any face of the turret. The turret unit has a hexagon turret.

The hydraulic feeding arrangement provides a separate feed for each face of the turret, and any



Capacity of the automatic chuck on the No. 1 turret lathe is regularly 13/16 in. but may be increased to 1 1/16 in. A lever-operated or a combination screw and lever-operated cross-slide can be provided

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proportion of the feeding movement can be automatically converted into rapid traverse.

Also illustrated is the Foster No. 1 turret lathe which has a regular automatic chuck capacity of ⅛ in. which may be increased to 1⅛ in. The eight spindle speeds are derived from a four-speed motor in the cabinet base driving a two-speed transmission located also in the base. The speed range is from 300 to 3,600 r.p.m. The speeds are selected by dial.

The spindle is mounted in precision ball bearings and is equipped with a quick stopping brake. Either hand-operated automatic chuck and bar feed, or cam-operated automatic chuck and bar feed, can be supplied. With the latter arrangement ,the opening and closing of collets and feeding of the bar is done mechanically; all that is required of the operator is to engage a clutch by means of a small lever on the front of the machine. The bar is unclamped, fed forward against the stop and reclamped automatically in approximately one second. It is supported inside of a tube and is fed into the machine by means of feed fingers which feed the bar up to the end of the collet. The bar support tube swings forward so that a new bar may be loaded from the operator's end of the rack.

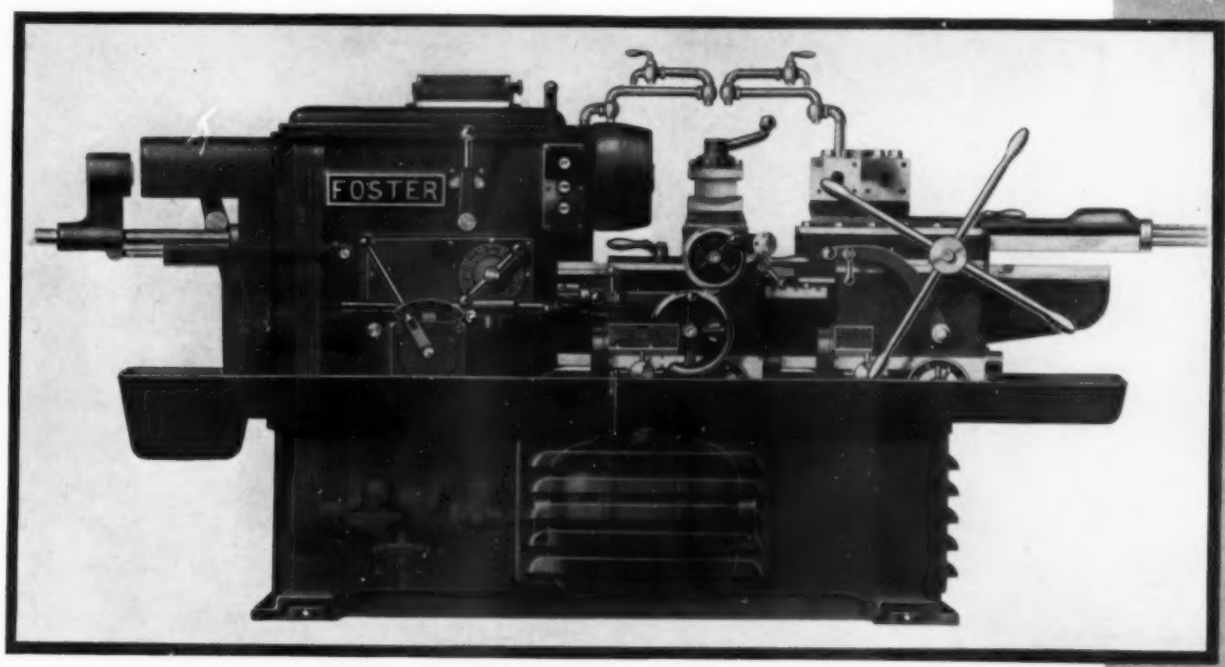
The machine can be had either with lever-operated cross slide or a combination screw and lever-operated type cross slide. The turret is automatically unclamped, indexed and reclamped by the backward and forward movement of the turret slide.

The 1½-in. universal turret lathe, also illustrated, was designed to take full advantage of the new cutting alloys. It has the same arrangement of speeds as the smaller model just described, but there is also a back shaft which results in doubling the number. These speeds may be arranged either as 16 in all or two ranges of 8, a high range for bar work and a low range for chucking work. The change from high to low range is by means of multiple disk clutches, and may be made instantaneously while the machine is under cut, if desired. These speeds are all dial selected. This machine also has nitrided hardened ways.

The automatic chuck and bar feed are hydraulically-operated, moving the hydraulic valve lever in one direction resulting in opening the collet and feeding the bar forward against the stop. Moving it in the other direction results in closing the collet and bar feed and moving the bar feed head back on the bar. The cross carriage is full universal with both cross and longitudinal feeds. The cross slide has an adjustable stop spool which provides power knockouts for each station of the square turret. The square turret is automatically indexed by a continuation of the unclamping movement of the releasing lever, and may be automatically indexed one or more stations, as desired.

There are 9 power feeds of the cross slide which are all dial selected and they may be doubled by using the lever at the head end of the machine. A ring turret binder clamps the turret. Nine power feeds are available for the turret saddle apron and these again are all dial selected. They may be doubled by the lever at the head end of the machine.

This machine is built in 1½-in., 2-in., and 2½-in. round bar capacity.



This universal turret lathe is available in 1½-, 2- and 2½-in. bar sizes, the first size being shown

Hutto Hones and Vertical Honing Machine

Several new types of hones and an improved model of its vertical honing machine have been developed by the Hutto Machine Division, 515 Lycaste Ave., Detroit, Mich., of the Carborundum Co., Niagara Falls. The Model RA high production connecting rod hone shown, permits the honing of more than one bore at a time by using a suitable fixture of the floating type. The lower end of the hone serves as a pilot for aligning the bores and piloting the hones to them when inserting.

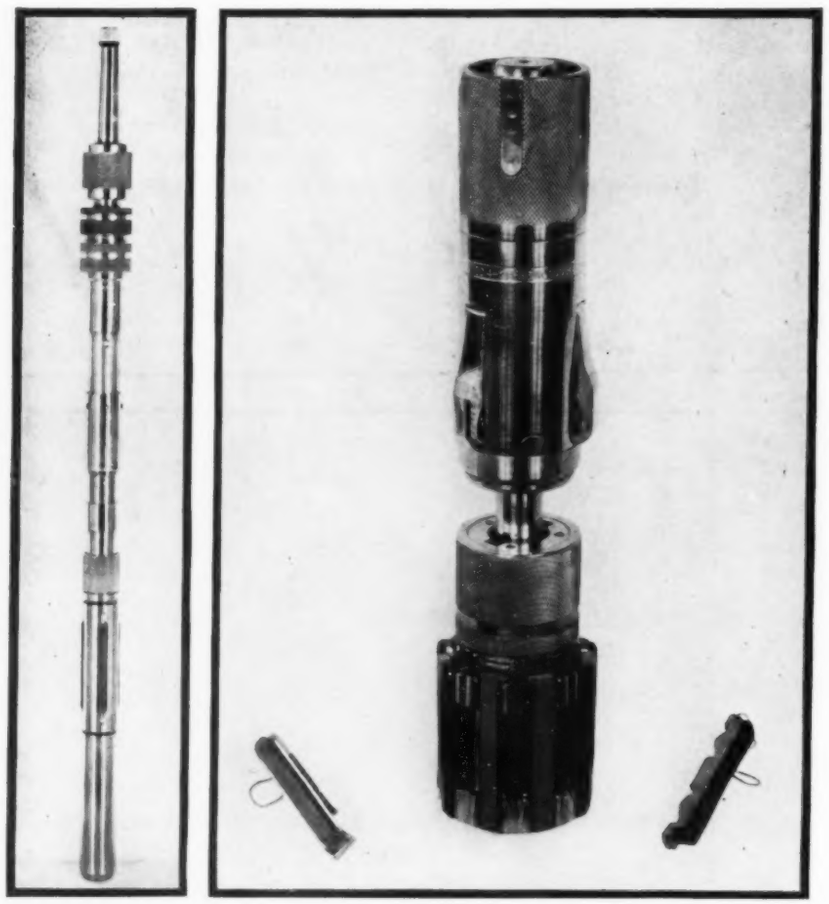
As is the case with the company's high-production, cylinder-finishing hone, this type is fitted with segmental abrasives for removing stock and finishing the bores and with fibers to act as guides to align the bores while the hone is cutting. These fibers also serve to eliminate stone markings that might otherwise occur in the upper bore as the hone is withdrawn. They also equalize wear on stone.

A quick-acting, automatic drive head expands and contracts the stoneholders as the hone passes through the piloting and actuating bushings. The expansion is positive and adjustment is necessary only when stone wear must be compensated for.

A feature of the tool is the separate adjustment built in for expanding the fiber guides separately and independently of the stone adjusting mechanism. A turn of a knurled sleeve on the hone, this sleeve being directly above the end of the stones and fibers, expands and contracts the fibers without affecting the stones. It is claimed that the life of a set of these fiber guides is considerable and that the use of this feature saves material and labor costs.

For honing cylinders of extreme length to a high finish and for controlling the hones manually, a series of finishing hones has been developed as illustrated. These hones differ from the automatically controlled type of high-production, finishing hones only in that the expansion and contraction of the abrasives are accomplished manually by setting up the adjustment on the drive head. This drive head is employed for driving as well as for controlling expansion and contraction of the stone.

The segmental members of the hone consist of abrasive fibers. These fiber guides eliminate the undesirable stone markings which may occur as the stone is being withdrawn from the bore. Through the use of a set of roughing stones for



Left — Model RA high-production connecting-rod hone which can finish more than one rod at a time by use of a suitable fixture. Right— Intended for cylinders of extreme length this hone is manually adjustable at the drive head at the top

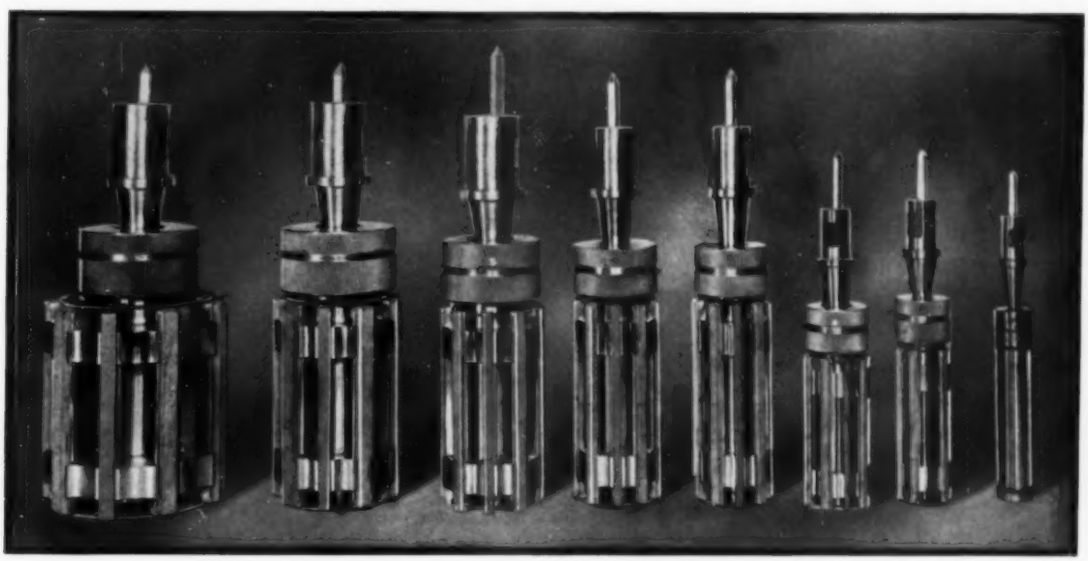
removing the greater part of the stock and finishing stones in the same hone body, and by expanding the fibers it is now possible to finish hone bores that must of necessity be honed on the horizontal type of machine. The same type of separate adjustment of the fiber guides as described in the previous item is included.

The same type of independent adjustment of the fiber guide has been applied to the line of automatic finishing hones, also illustrated. This line of hones was developed particularly for finishing on a high-production basis cylinders that have been diamond bored or otherwise fine bored.

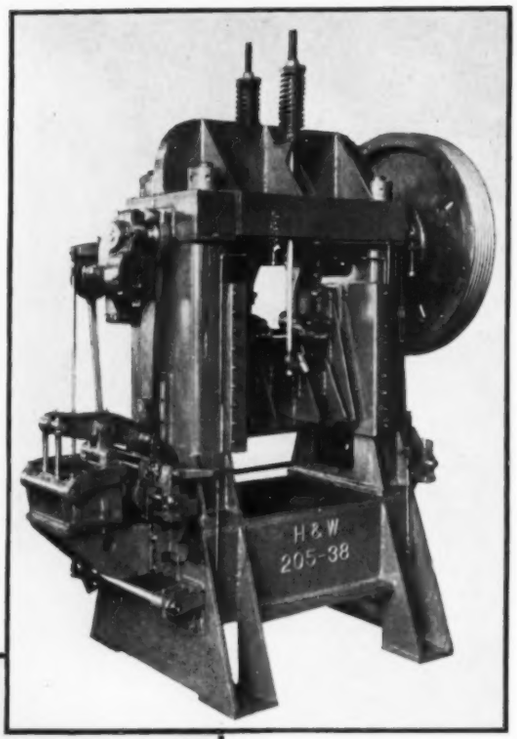
A new and considerably refined model of the V-300 series of honing machines is shown in the remaining illustration. These machines were first described just a year ago in *American Machinist*. As will be evident from the illustration, the machine is of the vertical, single-spindle type and reciprocation is by crank with hydraulically-controlled, variable, hydro-mechanical drive. This drive produces a harmonic reciprocating motion which is claimed provides straight as well as round bores. The machine is equipped with a mechanical lift out for withdrawing the hone from and inserting it into the bore. The lift-out is hydraulically operated and its stroke is adjustable.

The rotation speeds are infinitely adjustable within a specified range by means of a variable speed V-belt drive mechanism. Control of this mechanism is by a speed change lever on the gear case at the head of the machine. For honing blind end bores and similar work adjustment may be provided to permit dwell in the stroke at either or both extremities of it. Drive is through a multiple disk clutch and the brake is of the same type.

Improved V-300 Series vertical honing machine has a hydraulically controlled harmonic motion for the spindle to assure straight and round holes in the work

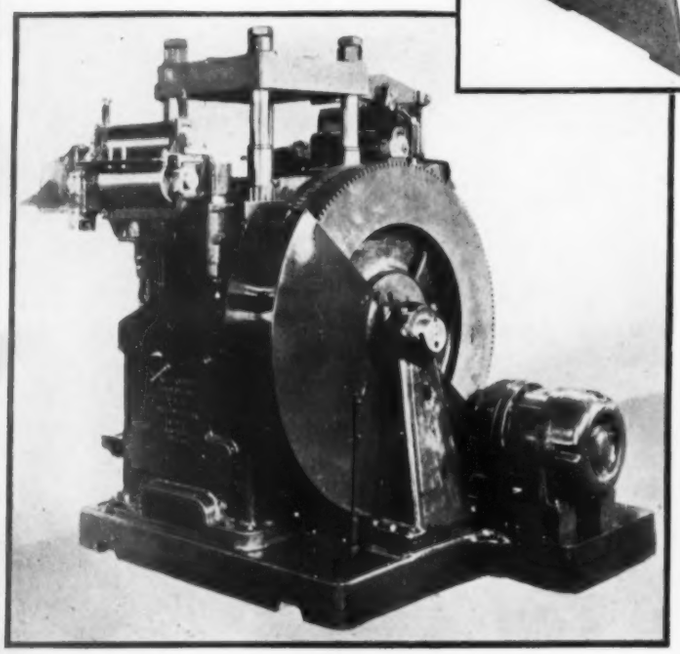


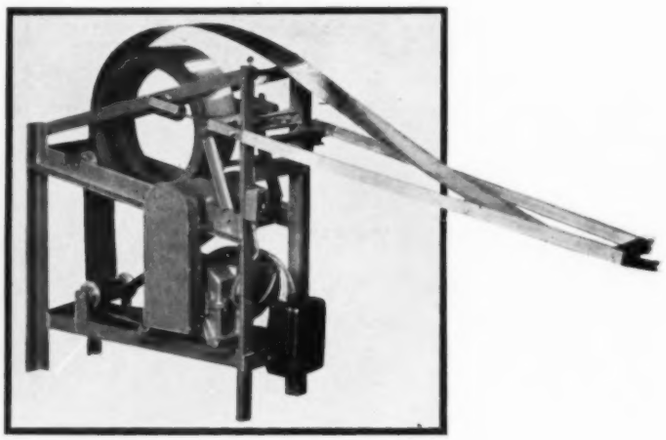
This line of automatic finishing hones is offered for high-production finishing of cylinders that have been diamond or otherwise fine bored



Right—This Henry & Wright automatic double-crank press has a capacity of 80 tons and a distance between the uprights of 38 in.

Below—A precision roll feed on the 50-ton dieing machine will handle stock up to 12 in. wide and a maximum feed pitch of 8⅝ in.





Below—Instead of loading the stock on a spindle it is merely dropped in the cradle of this motor-driven reel

Henry & Wright Automatic Press, Dieing Machine and Stock Reel

An automatic feed high speed steel press recently built by Henry & Wright Mfg. Co., Hartford, Conn., has been designated No. 204½-38. It is an addition to the company's line of automatic, double crank, straight sided, tie-rod-type presses, and is of welded steel construction, the frame members and slide being welded units normalized and annealed before machining to eliminate stresses. The uprights are hollow and internally braced, and the crown, bed and slide are designed for the maximum of rigidity. The press is equipped with automatic double roll feed of the same type used in the Henry & Wright dieing machine, and also with a scrap cutter. Its capacity is 80 tons, the distance between uprights being 38 in.

The improved model of the 50-ton dieing machine illustrated has also been announced. It is equipped with a precision double roll feed, which is claimed to have extreme accuracy and will handle material up to 12 in. in width with a maximum feed pitch of 8⅝ in. The scrap cutter automatically cuts material into lengths equal to the feed pitch.

An automatic motor driven cradle type stock reel is also in the list of new products of Henry & Wright. The cradle permits material to be dropped into it instead of being loaded upon a spindle as in the case of conventional reels. This arrangement is naturally of advantage when the coils are heavy.

The motor in the geared motor drive is controlled by a mercury switch which is actuated by a balanced arm resting upon the material between the coil and the roll feed of the press. This control stops the motor before sufficient material has been fed to allow material to touch the floor, and starts the motor before the material is pulled tight between the press and the coil. This obviates back pull against the roll feed of the machine so objectionable when intricate progressive dies involving pilots are in use. The reel operates without attention from the machine operator.

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Warner & Swasey

Turret Lathe Improvements

The three illustrations shown here portray improvements in the design of turret lathes built by the Warner & Swasey Co., Cleveland, Ohio. The close-up view of the headstock and cross slides with square tool block is included to show the heavy duty cross slide with square lock gib, and square turret. The cross slide is designed particularly for heavy cuts and coarse feeds such as are demanded wherever tungsten carbide tools are used. The square lock gib mentioned is on the right side of the cross slide and its flat surface presents an ideal means of taking the load for it is at all times at right angles to the load pressure. Hard steel replaceable wear strips have been added to the dove-tail guide of the cross slide, thus providing means of preserving the initial accuracy.

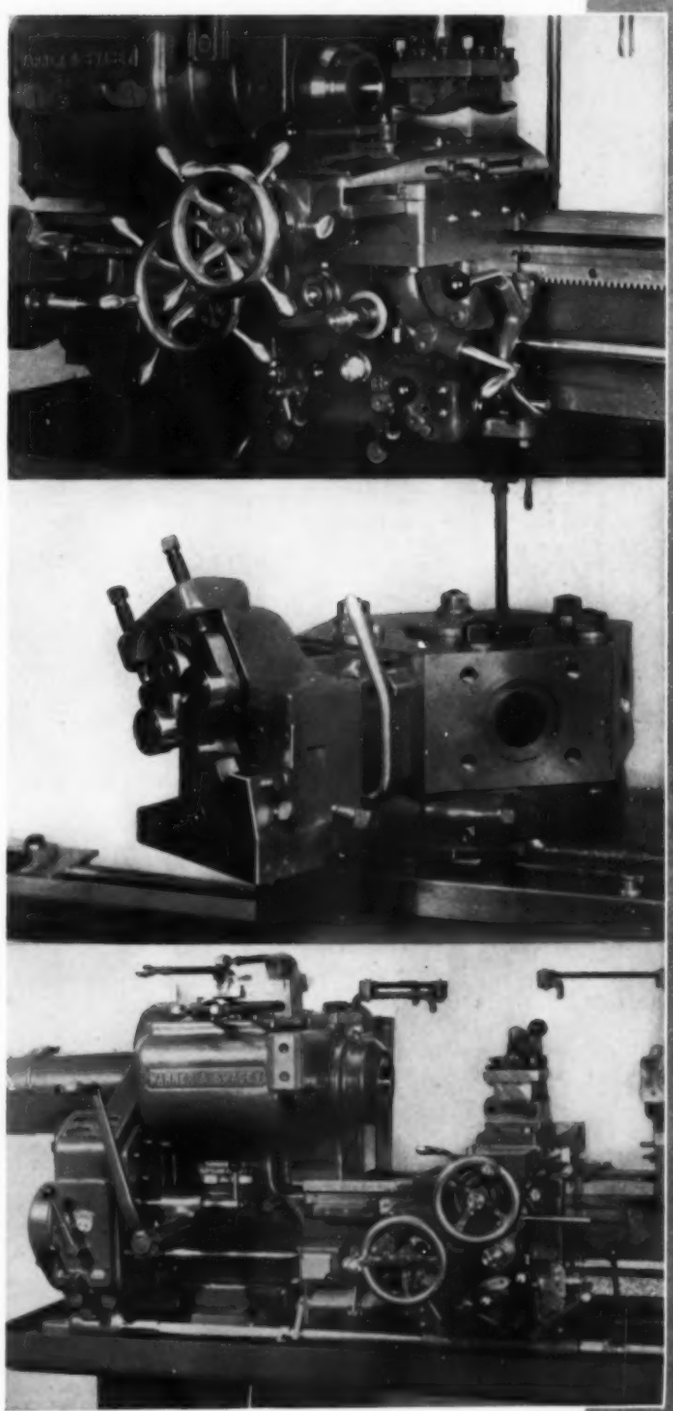
The square turret mounted on the cross slide is a new development. By removing the characteristic center stud through the turret, greatly improved rigidity is possible and better facility for cramping of overhanging tools. The index and clamp handle is located behind the square turret, thus preventing interference.

The other photograph showing the larger portion of a machine illustrates the lead screw attachment which is designed to overcome former shortcomings of turret lathes and simplify this operation.

The feed shaft leading to the apron of the cross slide is utilized for the lead screw but only that portion of the shaft which has hitherto been unused. This provides a positive thread and completely eliminates the conventional leader which must be gripped to the shaft at some predetermined point by means of a collar or a threaded nut. This new type of lead screw further supplies accuracy comparable with the accuracy of engine lathes where a special lead screw is provided for threading. To engage the follower with a lead screw the operator merely presses a lever on the left side of the apron; a simple interlocking mechanism prevents this engagement whenever the feed clutch of the apron is engaged. Threads of any standard pitch from 2 to 56 are available through pick-off change gears mounted at the head and gear box. The design of this unit makes it possible to return the carriage without reversing the spindle.

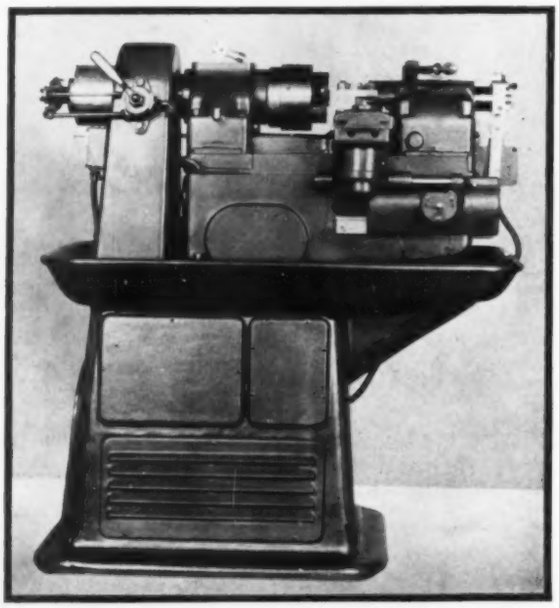
Heavy duty bar turners for ram type turret lathes are shown in the remaining illustration. These tools were designed for the heaviest work and the coarsest feed using Stellite or carbide cutting tools. In each case the body of the turner is as narrow as it is possible to make it, the width being made up of the rear roller diameter, the maximum work diameter, the thickness of the cutting tool and the set screw length. It will be noted from the illustration that the tool rolls are so placed as to make efficient steady rests for heavy work done from the cross slide of the turret lathe.

Top—Heavy-duty cross-slide (with square lock gib and square turret) designed for heavy cuts and coarse feeds. Center — Heavy-duty bar turner for ram-type turret lathes. Below—Leadscrew attachment which eliminates the conventional leader that must be gripped to the shaft by a collar



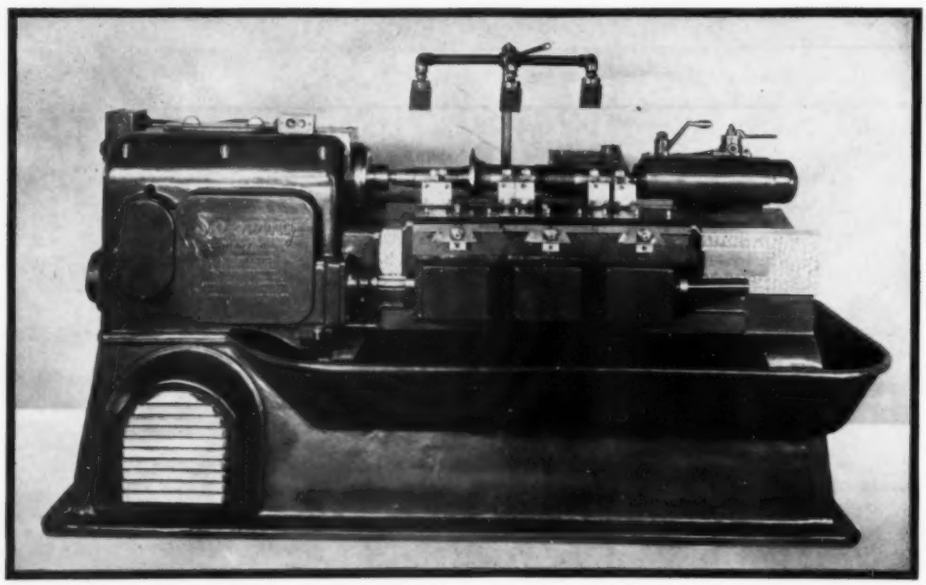
Lo-Swing Lathes, Star Centering Machine and Seneca Falls Work Driver

The Seneca Falls Machine Co., Seneca Falls, N. Y., announces three lathes, a drilling and centering machine and an automatic work driver. First of the three lathes is the model "U" Lo-Swing, which is built in two bed lengths, 12-in. and 36-in. centers, each size having a 5-in. swing. It is designed for turning pistons, bushings, stem pinions, steering knuckles and other short cylindrical work and can be used for both straight turning and for forming, or for a combination of both.



This model can be arranged for machining simple jobs coming through in small lots or to handle jobs on a high production basis. The cost of change over is small. The lathe is completely automatic in operation, the operator merely placing the work in the machine. When the machine starts it makes a complete cycle, and then stops with the carriage slide returned to the starting position. A single lever is operated to bring the tailstock center into position and to start the machine. When the machine is equipped with individual motor drive the motor is mounted in the base. Power may be transmitted either through a belt or silent chain, in either case the drive being entirely inclosed. Pick-off gears are provided for changing both speeds and feeds. All shafts are mounted on ball and roller bearings and the lubrication of the head end is automatic. The carriage ways are equipped with hardened and ground steel plates. Hardened and ground cams operate the longitudinal and cross-feed movement of the carriage slide, as well as the cross-feed movement of the rear forming and squaring slide.

Designed to fill the need for a small, accurate lathe, heavy enough to make high spindle speed practical, the Lo-Swing Imp will handle work that is too small for heavier automatic lathes and which heretofore has been handled either on bench lathes, or engine lathes which were not fast enough for the job. This model has the speed of the bench lathe, plus the stamina, rigidity and automatic operation of an automatic lathe. It is especially applicable to work on bushings, pistons, valves, bearings and other small parts. Equipped with motor it weighs approximately 1,700 lb.



Above—The Lo-Swing Imp is a small lathe, yet it is heavy enough to make high spindle-speeds practical. Right—Model "U" can be arranged to handle either small lots or high production work

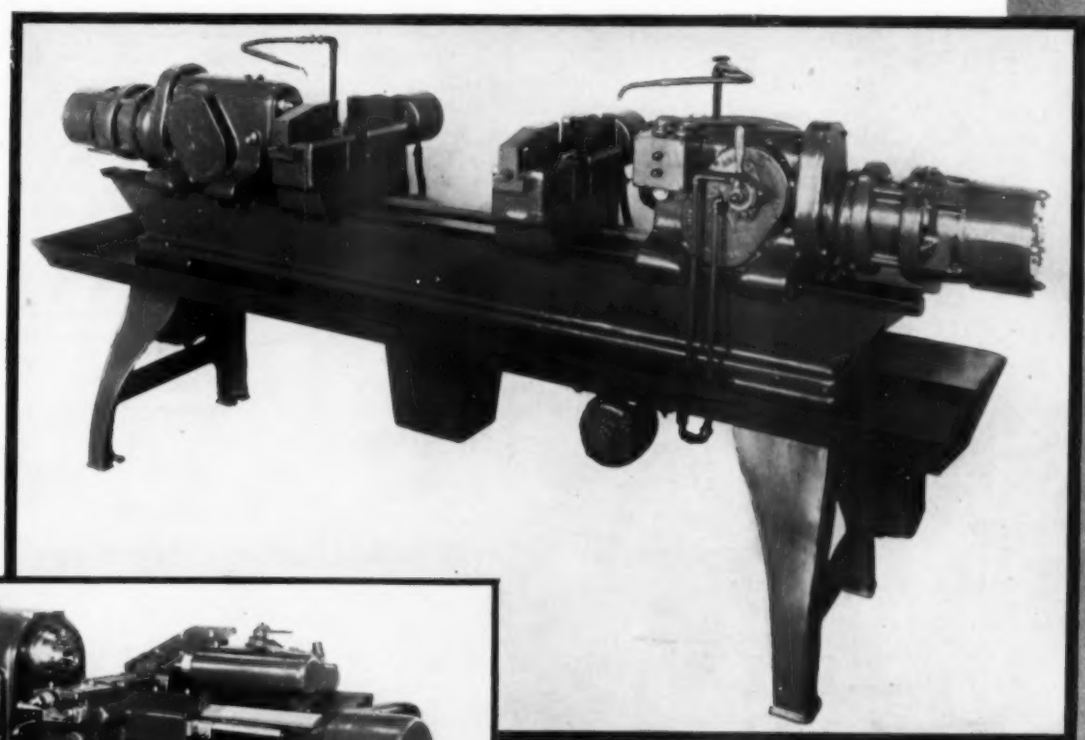
Its compactness is evident from the illustration. The spindle is large, mounted on pre-loaded precision ball bearings and capable of speeds up to 5,000 r.p.m. Both spindle and feed mechanisms are direct-driven, through V-bolts.

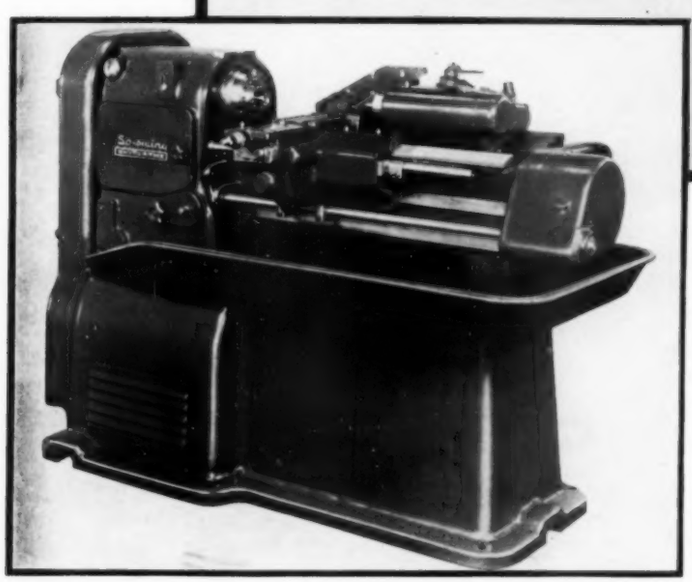
The ram-type carriage, carrying the cross-slide, rests on V-ways running the full length of the machine. The carriage, which is scraped for its entire length, is driven by a drum cam mounted in the bed of the machine. This cam is operated in turn by means of a worm and worm wheel, and variations in feed are obtained through pick-off gears. The cross feed is operated from a second path cut in the carriage feed cam, thus maintaining a positive time relation between the longitudinal and cross feed carriages.

The Lo-Swing Imp is capable of a wide range of tooling possibilities and is adapted to either chucking or between-center work.

The third lathe in the Lo-Swing line is the No. 1 Unitlathe, which introduces an interesting unit principle of design.

The foundation of this Unitlathe is a so-called "base machine," which consists of an integrally cast bed and headstock mounted on a cabinet base that houses the motor, coolant tank and pump, and forms the chip pan. Standardized and interchangeable functional units, assembled into this base machine when originally built, or later as required, provide a complete and versatile lathe of the type best suited to the work at hand. Thus, the machine arranged for plain turning may





Above—The Star automatic drilling and centering machine meets a demand for a better method of centering work on a production basis. Left—An outstanding characteristic of the Unitlathe is the manner in which each functional unit as incorporated becomes merged or "absorbed" into the complete machine design

The driver can be supplied for driving work where it is necessary to grip on a taper

be economically converted to any type, up to and including a full automatic. The No. 1 model applies the Lo-Swing method to the production of small and medium sized work in a manner that should guarantee the ultimate benefits and maximum efficiency possible with carbide and other recently developed high speed cutting tools.

Designed for centering work on a production basis, the Star automatic drilling and centering machine provides high production on a continuous basis with sufficient flexibility to permit economical change over when necessary.

This has been accomplished by using two motor-driven independent heads each with its own closed cycle and independent speeds and feeds, arranged to operate in time relation to one another. The heads are built for high speed and long life. All gears are made from alloy steel and heat-treated. The spindle and all revolving shafts are mounted on ball bearings, and each head is provided with a hardened steel barrel cam which imparts the feeding movement to the spindle and makes it possible to vary the feed stroke to suit individual operations. Cams may be changed easily to meet varying conditions.

Standard quick-acting, equalizing vises are available and may be arranged to operate singly or in pairs. The standard cycle provides rapid approach, feed, withdraw near the end of the feed stroke (to clear chips) and a slow final feed insuring a smooth accurate center hole. Other variations of this cycle are possible so that one end of the shaft may be drilled, centered and counterbored while the other end is being centered.

An automatic work driver has also been brought out by the Seneca Falls Machine Co., and is designed to cut dogging time so that one operator can run two or more machines. It is adaptable to all makes of turning and grinding machinery.

Eccentric driving jaws are mounted on a guided slide which is free to adjust itself to any eccentricity between the center and the outside diameter of the work, thus balancing the gripping pressure of the jaws and eliminating all strain on the head center. The slide is mounted in a guide way giving a positive drive and eliminating chatter. The breaking of tools caused through slippage is done away with, because the harder the pull, the tighter the grip. The body is recessed on the back, the same as any conventionad lathe chuck, and can be attached to a check plate or directly to the spindle by four bolts.

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Capacity of this riveter is ⅜ in. cold iron rivets

The hydraulic pressure generator provides large-volume delivery at moderate pressure for rapid advance stroke

Hannifin "Hi-power" Portable Hydraulic Riveter

A production riveting machine operated hydraulically and comprising a portable yoke-type hydraulic press and an automatic hydraulic pressure generator, connected by high-pressure hoses and electric control cable, has been brought out by the Hannifin Manufacturing Co., 621 South Kolmar Ave., Chicago. It is known as the "Hi-Power."

The portable yoke press weighs 54 lb. and develops a maximum pressure of 35,000 lb. to head the rivet. This capacity is ample for ⅜-in. cold iron rivets. The throat of the yoke is 6x6 in., and the ram stroke 3 in., and the maximum pressure developed on the dies may be adjusted to suit the work.

Control of the riveting operation is by a single push button at the top of the press handle. Depressing this button actuates the hydraulic pressure generating unit and its control valves, and the riveting cycle is completed automatically. The hydraulic pressure generator which is a completely

MACHINE TOOL SHOW

automatic power unit is driven by a 2-hp. motor and its outside dimensions are 32x17x56 in. It provides large-volume delivery at moderate pressure for rapid advance stroke of the press ram, automatic step-up to high pressure for the actual heading of the rivet, and an automatic reversal upon reaching maximum pressure, with rapid reverse stroke of the ram to starting position.

The complete riveting cycle is said to be 2½ sec. per rivet, and it is also claimed that this speed is easily maintained. Operation of the press is as follows:

(1) Rapid advance stroke at moderate pressure, until the die touches the rivet, and follows pressure of the control button. (2) When the die makes contact with the rivet the hydraulic pressure generator automatically delivers the high pressure to head the rivet (working pressure 5,000 lb. per sq.in.). (3) At the peak pressure the ram is automatically reversed, and returns to the starting position with a rapid reverse stroke at moderate pressure. (4) At the end of the reverse stroke the control valve automatically moves to neutral and the oil-pump unit idles at zero until the next cycle is started.

The press will not repeat. When the control button is depressed and held down the yoke press completes one cycle and stops. It is necessary to release the control button and depress it again to start the next cycle of operation. An instantaneous safety stop operates at any point in the riveting cycle.

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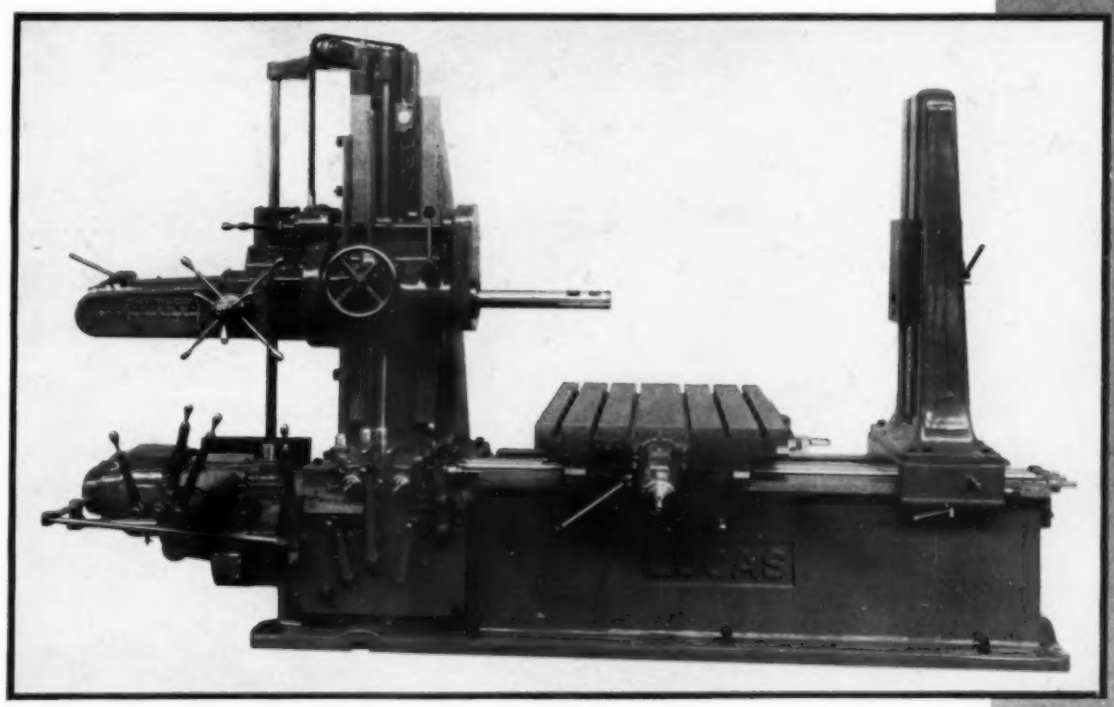
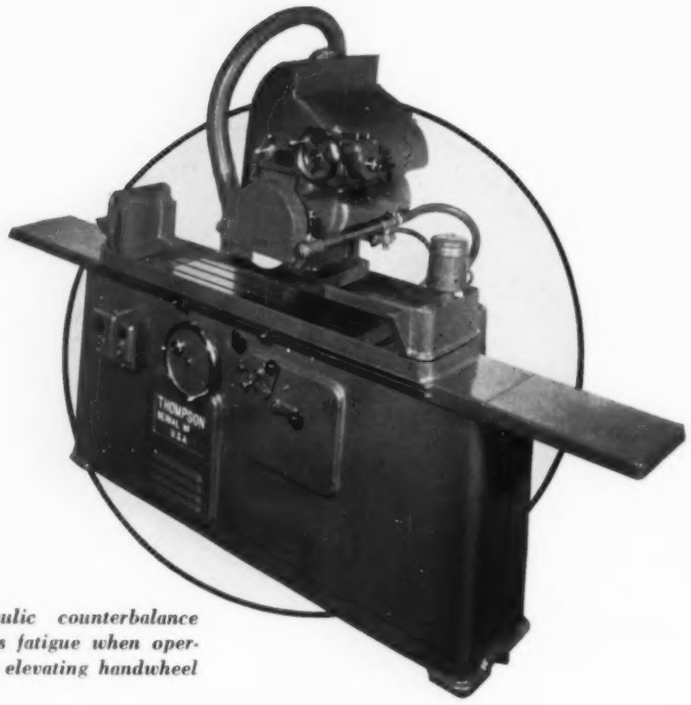
Lucas Boring, Drilling and Milling Machine

The illustration shows the No. 41 Lucas "Precision" horizontal boring, drilling and milling machine with auxiliary high speed drive, whereby speeds up to 1,200 r.p.m. and 860 r.p.m., are made available in the 3-in. and 5-in. diameter main spindles, respectively. These machines, with the auxiliary drive, have just been announced by the Lucas Machine Tool Co., East 99th Street and New York Central Railroad, Cleveland, Ohio.

Additional rigidity has been built into these new models to permit the extension of the spindles for a considerable distance for end milling recessed or offset surfaces, at the high speeds available in the spindle. Other special features include a dial indicator indexing device, employing standard end measures and inside micrometers for original work, or special length gages corresponding to center distances between holes to be bored in repetition work. The dial indicators insure uniform contact without danger of springing and indexing error.



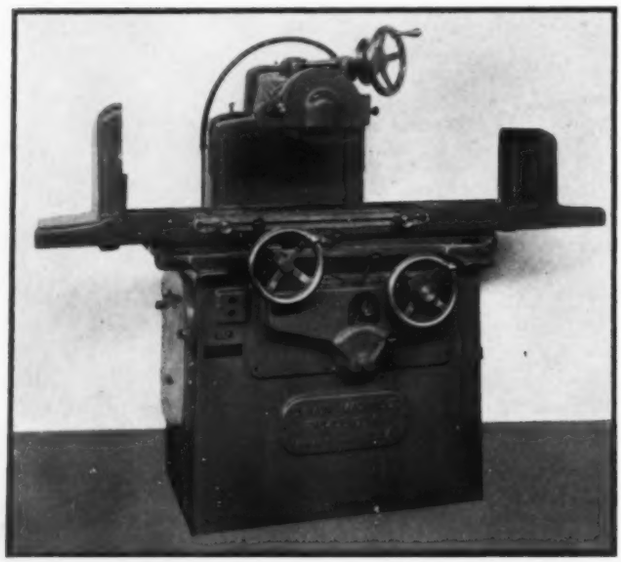
A dial indicator indexing device, employing standard end measures and inside micrometers, insures uniform contact without danger of springing and resulting error in indexing



A hydraulic counterbalance eliminates fatigue when operating the elevating handwheel

Thompson Hydraulic Surface Grinder

The "B" Special hydraulic surface grinder just introduced by the Thompson Grinder Co., of Springfield, Ohio, is 9 in. wide by 40 in. long and the height under the wheel on the standard machine is 12 in. with a 10-in. wheel. Additional height may be obtained by changing the height of the column.



Fast and accurate grinding is claimed for the Type G surface grinder

This type of surface grinder is adapted to work that is long and of medium weight, such as spline shafts and broaches. Head and tail stock assemblies are also adaptable where centers are required for grinding. Loading devices and fixtures for holding units to be ground on a production job basis may be easily applied. Specially designed flux blocks are used in fixtures that hold a number of units which are to be ground with a taper, such as gate valve plates, on a magnetic chuck. Auxiliary dogs may be used to jump the table to either end to facilitate loading or unloading.

Auxiliary Hand Feed

A 3-hp. built-in motor running at 1,700 r.p.m. drives the grinding spindle, which is mounted in plain and precision ball bearings, lubricated throughout with filtered spindle oil. The feed of the reciprocating work table varies from 10 to 100 ft. per min. with an automatic cross feed of $\frac{1}{32}$ in. to $\frac{3}{4}$ in. per reversal of table. There is also a slow continuous wheel truing speed, and a rapid traverse obtainable by moving the control lever in the opposite direction. The machine has an auxiliary hand feed to the wheel head which may be used when grinding up to a shoulder.

Two extra units that increase production are the hydraulic counter balance and the automatic wheel truing device. The hydraulic counter balance enables the operator to spin the elevating hand wheel in either upward or downward direction, thus eliminating fatigue as well as speeding up production. The hand wheel is graduated in steps of 0.005 in. and by use of the vernier attachment it can be read to increments of 0.00025.

The automatic wheel truing device, trues the wheel at each complete stroke of the wheel head travel, thus eliminating shutting down the machine and setting the diamond on the chuck or bolting it to the table for wheel truing. Once the machine is set up for a type of production job there is no need for shut down other than to replace worn-out wheels.

Oil pressure for the hydraulic system is supplied by a direct-connected oil pump mounted on a rigid sub-assembly power unit base. The base is mounted on vibration-absorbing rubber blocks acting in shear. The pump delivers approximately 150 lb. pressure at the control panel, and is connected to the system with rigid tubing.

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Diamond Surface Grinder

A new member of the Type G series of surface grinding machines built by the Diamond Machine Co., Providence, R. I., is illustrated. It is known as the Type G-4 and differs from other models in this series principally in the location of the hand wheel and in the greater flexibility of operation. The outstanding feature claimed for it by its builder is its ability to do fast and accurate grinding.

MACHINE TOOL SHOW

Buhr "Hydroscru" Power Unit and Two-Way Drill

The Buhr Machine Tool Co., Ann Arbor, Mich., has just introduced the "Hydroscru" power unit in which the complete mechanism moves on the ways of a stationary base. Spindle speeds are variable and secured by change gears between the motor and the spindle.

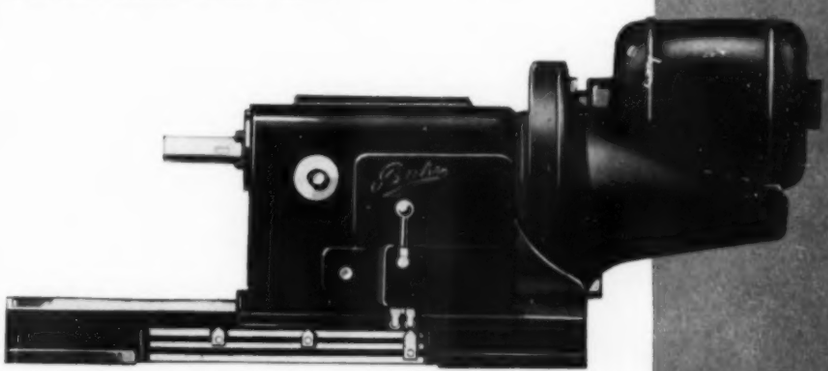
The drive spindle is provided with a No. 4 Morse Taper and a driving slot for multiple head adaptation. If the 18-in. stroke of the unit is not enough for the job in hand, it is only necessary to provide a longer base. The rate of feed can be changed by accessible change gears, giving a range of from 0.002 in. to 0.030 in. per revolution of the spindle.

The feed and rapid-advance control dogs are located in front for quickly changing the stroke, feed and rapid advance. The control lever will start, stop or reverse the unit at any desired position.

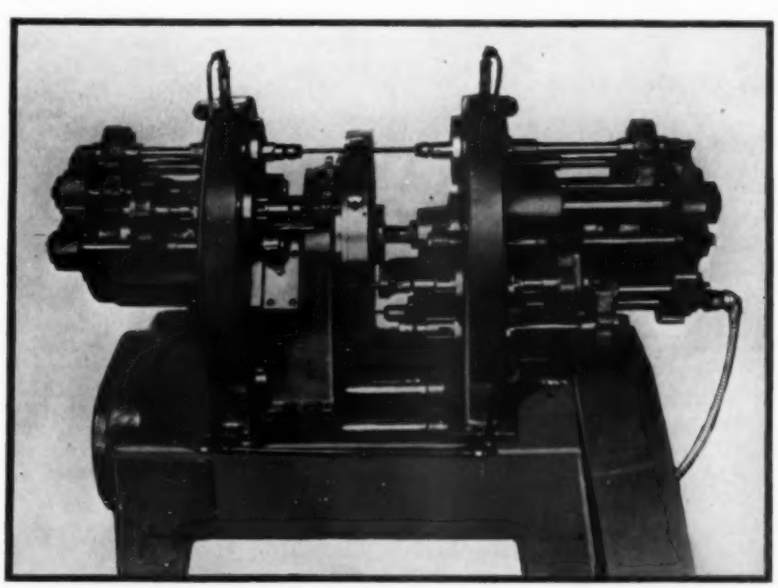
The "Hydroscru" unit may be used either as a single unit or on two, three or four machine ways, and in any combination of horizontal, vertical or angular mountings. Feed stroke is 18 in. Feed changes are made by pick-off gears for drilling, reaming, spot-facing and tapping operations.

The two-way driller illustrated is drilling and countersinking the cotter-pin hole in a $\frac{3}{8}$-in. bolt. It is driven by a 5-hp., 1,800-r.p.m. motor through V-belts. Anti-friction bearings are used and all moving parts are lubricated by an oil pump with sight feeds in the oil lines.

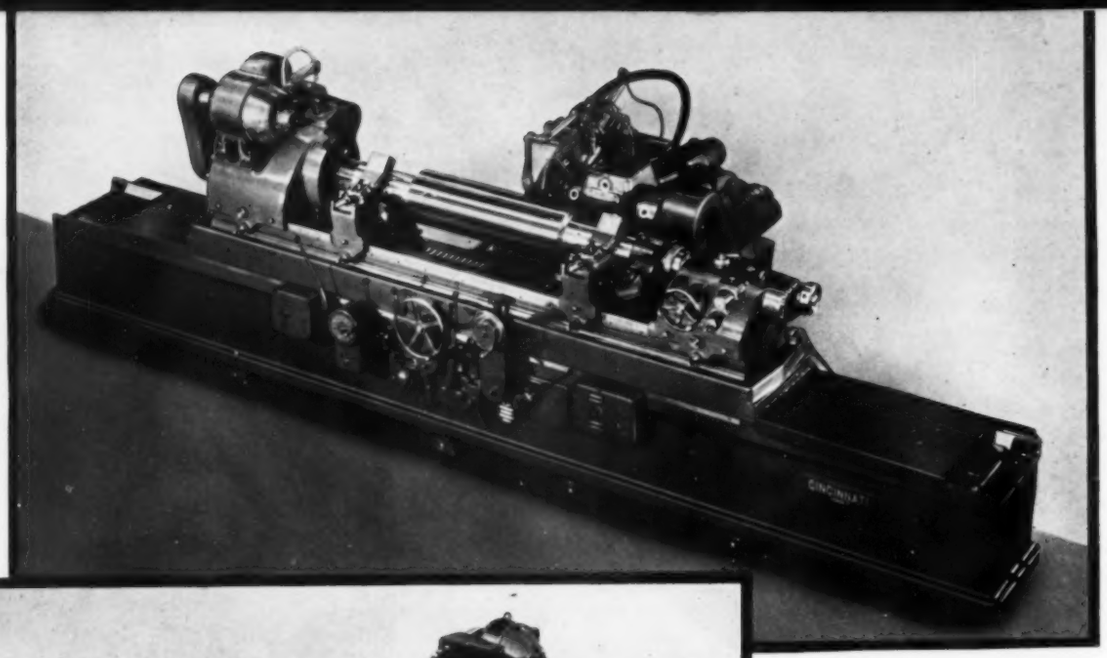
A cam operates the index. In the first position countersinking is done on both sides. In the second position the hole is drilled part way through from one side. In the third position the hole is drilled part way through from the other side. In the fourth position the hole is drilled through. In the fifth position the hole is checked and the machine stopped if the part is imperfect, thus eliminating scrap. In the sixth position the part is removed from the index and dropped in a pan. The drill spindles are operated by a drum cam and are adjustable in and out for wear of the drills and for insertion of new drills.



For step drilling accessible control dogs govern the amount of feed and rapid traverse



This two-way machine loads, indexes, checks and ejects automatically at the rate of 3,600 pieces per hour



Wheel truing is now independent of any other unit on the machine. The wheel can be trued straight or with a slight crown. Bar- or cam-type cambering mechanisms are available

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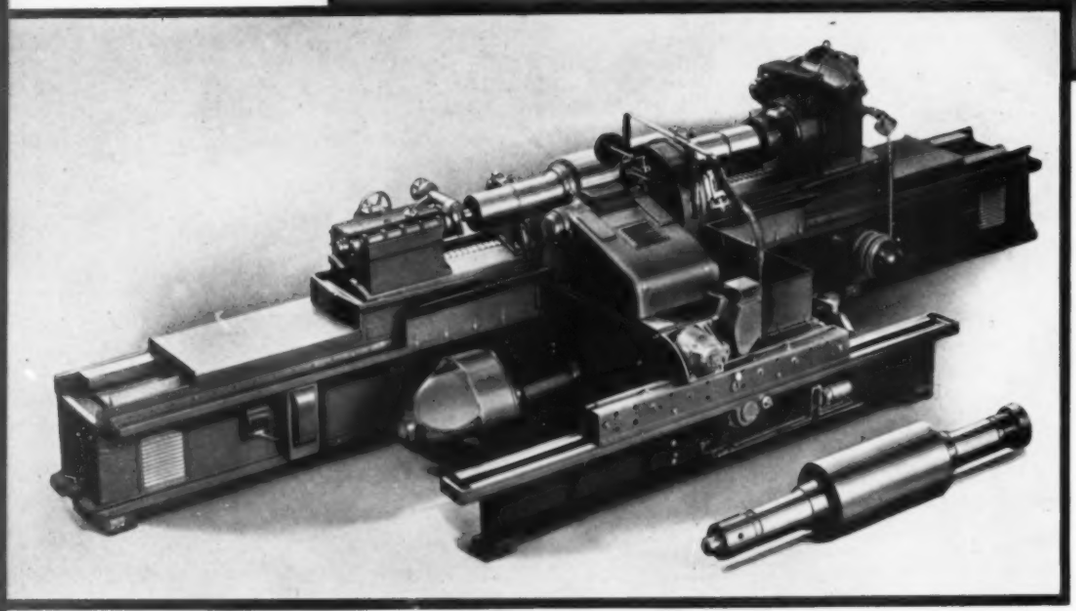

Cincinnati Improved Roll Grinders

Many improvements have been incorporated in the roll grinder announced by Cincinnati Milling Machine and Cincinnati Grinders, Inc., Cincinnati, Ohio, making it simpler to operate and at the same time producing more accurate work having a higher quality of finish. They are built with 20- 24- and 28-in. swing and distance between centers up to 192 in. They have the capacity to take cuts ranging from the roughing of chilled alloy iron rolls to the most sensitive finish and accurate cuts.

Wheel truing is now independent of any other unit on the machine. A hydraulic cylinder located behind the wheel guard supplies the motive force for traversing the diamond across the wheel. It is arranged so that the wheel can be trued either perfectly straight or with a slight crown as necessitated by the type of roll. A single directional control lever determines the direction of travel of the truing tool across the wheel, while the setting of a knurled knob determines the rate of traverse.

A new radial type of spindle bearing increases the accuracy and finish obtainable. These new bearings have a long life and are decidedly free from frequent adjustment. In fact, it is not necessary to readjust when changing from the heaviest roughing cut to the lightest finishing grind.

High efficiency, fine finish and low maintenance are insured by pressure feed lubrication to work and table ways, power crossfeed to wheel head, low angle table with thrust support rack, ample range of work and table feeds.

All electrical control buttons are conveniently centralized at the operator's position in front of the machine and enclosed in two neat appearing boxes. All control levers have been compactly grouped to provide for easy and fast operation.

Two types of cambering mechanisms are available for these machines, a bar type and a cam type. The flexibility of the bar-type cambering device allows a great variety of concaves or crowns to be ground on the roll. It is also desirable for finishing rolls having a number of different curvatures. This mechanism consists of an auxiliary bed, securely bolted to the rear base of the machine and supporting a traversing table which carries a camber bar. Motion to the camber table is transmitted by and synchronized with the machine table. Jack screws enable the camber bar to be set to the curvature which corresponds to the roll, or a bar of permanent form can be used when only one definite curve is necessary for all rolls.

MACHINE TOOL SHOW

A shoe, fixed to the tilting wheel head casting through an intermediate bracket forms the contact between the wheel head and the camber bar. As the camber table traverses, the wheel is tilted toward or away from the roll, due to the bearing shoe riding on the bar.

New setups and adjustments are easily and accurately made, permitting duplication of work within extremely close accuracy limits. Setting the camber bar is a relatively simple operation because the work is ground to the exact contour of the bar. A close reading indicator enables the operator to check accurately the amount of camber.

Smooth movement of this mechanism is assured by the heavy synchronizing drive and by the pressure feed lubricating system for the camber table and bed bearing surfaces, a duplicate of the main table way lubricating system. A single lever in front of the machine engages or disengages the camber mechanism.

The cam type cambering device consists of a train of pick-off gears, a cam which is driven by the machine table and a tilting wheel head which is operated by the cam. The change gears drive a shaft which extends through the bed and to which a cam is fixed on the rear end. The cam operates a lever and plunger under the rear end of the wheel head. This unit being mounted on trunnions is tilted toward or away from the work as the cam rotates, thereby creating the desired concave or convex shape on the roll being ground. The cam and all other parts within the cambering unit which affect accuracy are hardened and adequately lubricated. A hydraulically operated backlash device, automatic in action, eliminates the "play" from the entire mechanism. A single lever in front of the table engages the cambering mechanism.

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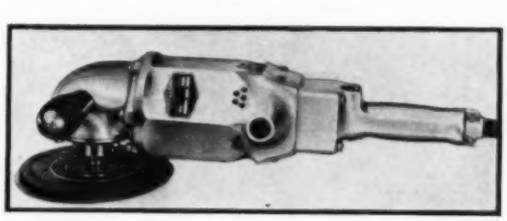
Black & Decker Drill and Sander

The Junior drill, a practical, handy unit, built by the Black & Decker Mfg. Co., Towson, Maryland, meets the demand for an odd-job drill. Aluminum housings are rounded for easier handling and made to stand hard knocks. Its "Compo" oil-less bearings are designed to give smooth, trouble-free operation. A powerful universal motor is especially built for this unit. The slide switch, located on top of the large, easy-grip handle, is controlled by the thumb, permitting a firm grasp of the tool at all times. The tool is available for the following voltages: 32, 110, 220 or 250 volts.



Black & Decker sander

The company has also developed a 7-in. superservice sander for heavy-duty sanding and metal finishing on a high-speed production basis, giving high cycle performance without the wiring costs of high cycle installation. The commutator and switch compartments are sealed against abrasive dust and dirt. Improved ventilation keeps the motor cool. The flexible pad insures maximum working area. The standard equipment includes plunger switch, detachable side handle, and twelve standard disks. Standard voltage is 110 volts, but the sander is also available for 220 or 250 volts.

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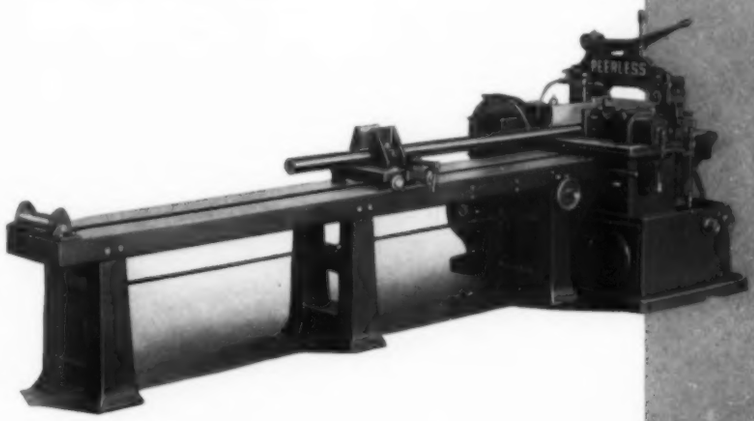
Peerless Sawing Machine

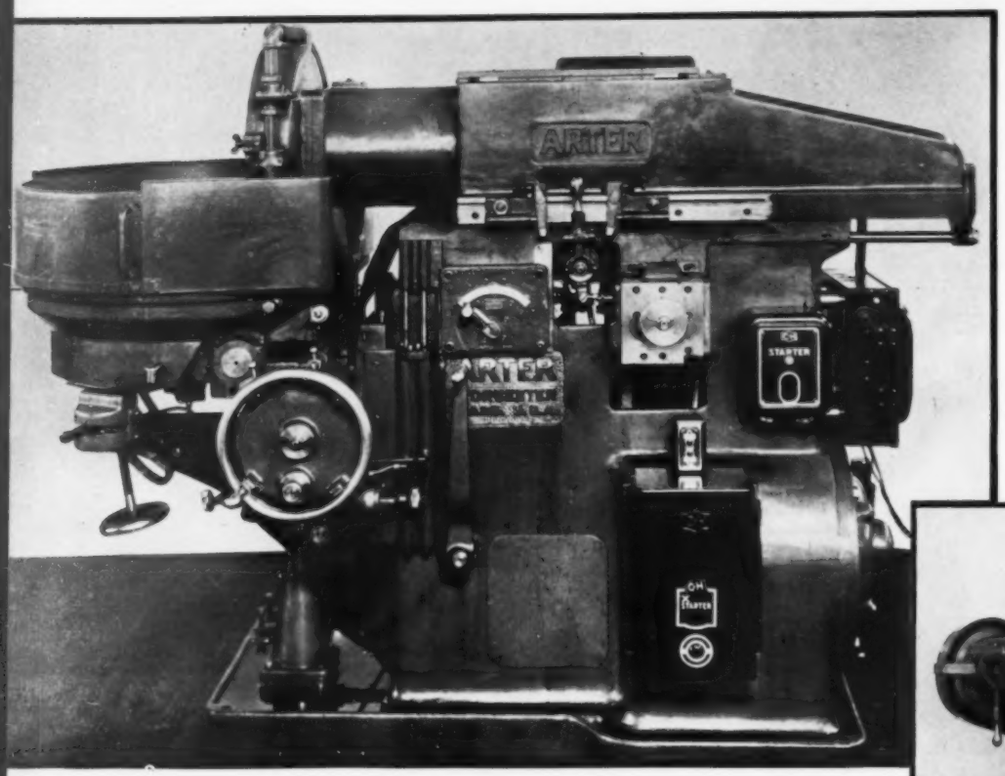
A power hack sawing machine known as a 6½ in. x 6½ in. Peerless improved high duty metal sawing machine has been introduced by the Peerless Machine Co., Racine, Wis. It can be furnished with or without the hydraulically operated automatic bar feed with conveyor shown in the illustration. An inclosed three speed sliding transmission, with all gears running in oil, provides for strokes of 60, 100 and 145 per min. approximately. Either V-belt motor drive or regular belt drive is available. On the former the drive and motor are fully inclosed within the machine base.

The blade capacity is 10 to 14 in. inclusive, and pushbutton control is standard equipment. The vise on the regular machine without the automatic bar feeding equipment is arranged for straight or angular cutting. Accurate setting is insured through the combination of the saw frame with its four horizontal bearings and the saw frame guide with four vertical bearings entirely surrounding the blade.

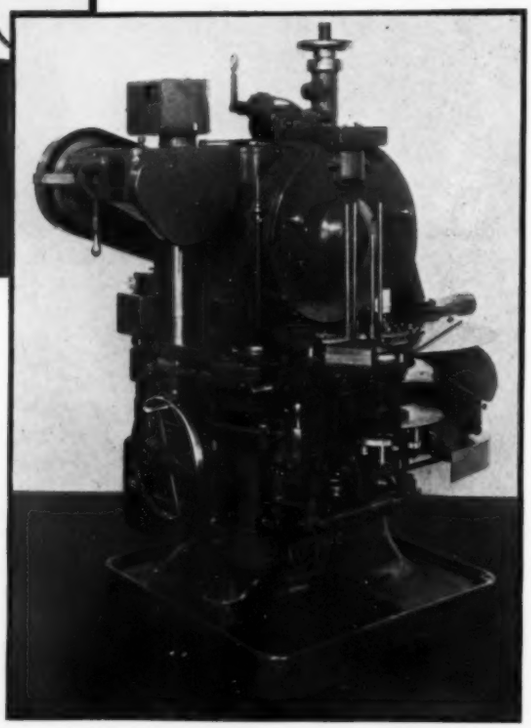
The automatic bar feeding equipment illustrated is hydraulically operated. It automatically opens the vise, feeds the bar of stock forward to the gage, closes the vise and continues to repeat the cycle until the entire bar is used up.



The hydraulically operated automatic bar feed and conveyor are optional



Left—Hydraulic rotary surface grinder in which an infinite number of chuck speeds is available. Below—Cam control is used for the feed of this piston-ring grinder. Rings are positioned in a vertical magazine timed with the wheel movement



Arter Surface Grinder and Piston Ring Grinder

The Arter Grinding Machine Co., 15 Sagamore Road, Worcester, Mass. has announced the hydraulic rotary surface grinder illustrated. The machines are built in three sizes having chuck diameters of 8 in., 12 in., and 16 in., respectively.

The wheel spindle, which runs on preloaded ball bearings, is driven directly by a motor, the rotor of which is mounted on the spindle. The chuck is driven by V-belts from a hydraulic motor. On an extension of the motor shaft of a flange-mounted electric motor built into the bed of the machine, two oil pumps are mounted in tandem. The higher pressure pump delivers oil to the hydraulic motor through a suitable valve so that an infinite number of chuck speeds is available. The lower pressure pump delivers oil to a cylinder for moving the wheel slide hydraulically, thus providing a wide range of speeds to this slide.

The magnetic chuck rests on a flat track bearing, thus providing a mounting that is not disturbed by wheel pressure whatever the diameter, weight or shape of the work. The final drive to the chuck is by worm and worm wheel. The work table can be tilted for grinding concave or convex surfaces, and if desired an automatic, hydraulically operated work table elevating attachment can be supplied.

The piston ring grinder, also illustrated, is a distinct departure from older models made by this company. The wheel spindle mounted in ball bearings is positioned eccentrically in a quill, also mounted in ball bearings. The wheel is fed down into the work by rocking the quill. The feed is under cam control, there being a rapid lifting movement off the work in each cycle, as well as a fast approach to the work, a slow grinding feed, and a dwell against the positive stop. The wheel spindle pulley mounted on the end of the spindle is driven by multiple V-belts from a motor, flange-mounted, which is built into the bed of the machine. The chuck spindle runs on precision, preloaded ball bearings.

Rings are positioned in a vertical magazine. In timed relation to the wheel movement and the chuck movement, successive rings are carried by a plate from the magazine on to the constantly revolving magnetic chuck. An automatic switch is provided for the chuck. During each cycle a ring is ground, removed from the chuck, and the next ring carried on to the chuck. The chuck spindle is driven by V-belts from an individual motor and an electric motor pump provides oil for the hydraulically operated wheel dresser which is mounted on the wheel guard.

MACHINE TOOL SHOW

Greenlee Four-Spindle Automatic Screw Machine

Greenlee Bros. & Co., Rockford, Ill., are showing a four-spindle automatic screw machine built in two sizes to take 7/8-in. and 1-in. round stock, respectively. Spindle speeds are available up to 3,400 r.p.m. Each spindle has four Timken bearings, assuring ample take-up and rigidity, which reduces chattering to a minimum.

The machine is open in construction and accessible for the operator to get at. The height is such that it is possible for the operator to reach all four spindles from either side of the machine. This, together with the accessibility of the slides and spindles, increases the possibility of faster set-ups and less down time when changing tools.

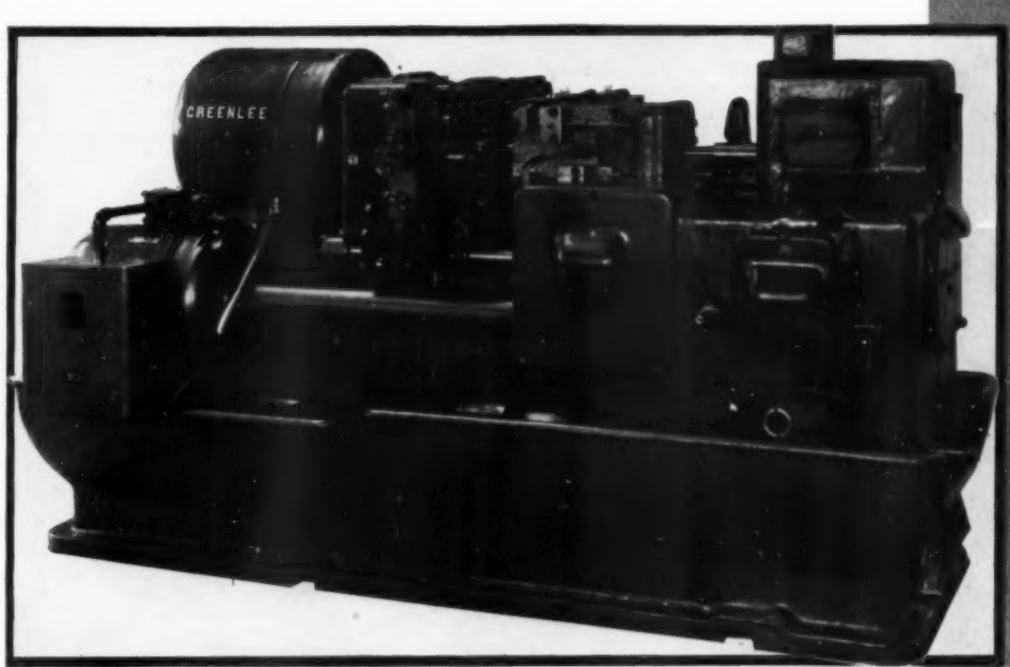
Compensating stops for the cross-slides are mounted on the outside of the cross-slide brackets and index with the spindle carrier, eliminating the possibility of any chips lodging between the compensating stop and stop rod. Live drilling spindles can be mounted in any or all of the four positions with threading and tapping attachments in the third and fourth positions.

All moving shafts are mounted on anti-friction bearings, automatically lubricated by a pump mounted in the bottom of the gearbox. The collet closing spools are made in three pieces and stock feeding rings are mounted on ball bearings so that they do not rotate with the spindle when the collets are being opened and closed and the stock is being fed forward. Instead, they roll across the operating shoes as the spindle carrier indexes, eliminating considerable wear on the shoes.

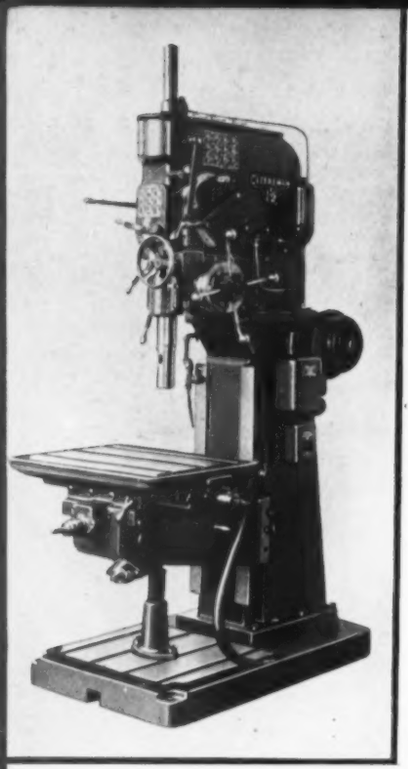
Standard equipment includes revolving stock reel mounted on antifriction bearings, which eliminates knocking the corners off hexagon or square stock, and the usual noise of the stock when it whips in a stationary tube.

The usual tool-slide construction standard on all Greenlee four-spindle automatics, and the inverted V-type construction with an intermittent gear between the hardened and ground steel ways for driving the slide forward and return, is used on this machine. The stock is fed out between the fourth and first positions while the spindle carrier is indexed, eliminating the use of disappearing stock stops and allowing for the use of accelerated or live tools in the cut-off position.

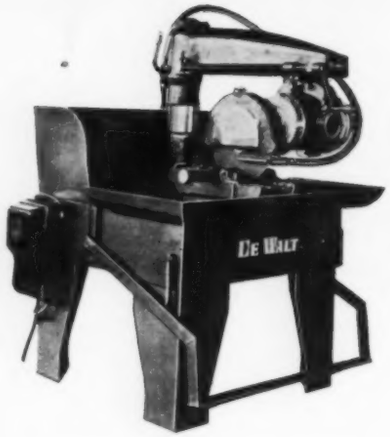
The standard Greenlee cross-slide cam construction is used on this machine, with pick-off plate cams held in place by a collar and a pin, to insure quick changeability. A stationary collet with a sleeve moving up and down on the collet taper, the sleeve being keyed to the spindle, is the opening and closing collet construction used. A wide feed range per spindle revolution is possible, the range being from 0.0025 in. to 0.022 in. per revolution. The standard stock feed length is 6 in. with standard turning length of 5 in. The chuck capacity is 1 in. round on the 1-in. machine and 7/8 in. round on the 7/8-in. machine.



Height of the machine is such that the operator can reach all four spindles from either side of the machine. The standard Greenlee cross-slide cam construction is used



Greater power and speeds have been applied to the Cleereman drilling machines



Above—DeWalt metal cutting saw which is built in sizes to 20 hp. Right—Lumber up to 16-in. thick can be handled

Cleereman Upright Drilling Machine

Gear back lash, excessive twisting of shafts, and the deflection of the major units in a drilling machine must be reduced to the minimum if proper use is to be made of high speed steel and tungsten and tantalum carbine cutting tools. These factors have been taken care of in the C-1½ and C-2 upright drilling machines just introduced by the Cleereman Machine Tool Co., Green Bay, Wis., and distributed nationally by Bryant Machinery & Engineering Co., Chicago. In addition, greater power has been introduced and faster speeds are available. The units are completely geared with positive speeds, and an automatic pressure oiling system lubricates the gearing and the anti-friction bearings.

The C-1½ machine has a capacity of 1½ in. in SAE 1035 steel and is made in the following sizes: 20 in., 22 in., 24 in., and 28 in.

The C-2 machine has a 2-in. capacity in SAE 1035 steel and is made in the 24 in., and 28 in. sizes. Drill heads are adaptable for gang drills.

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DeWalt Metal and Wood Cutting Machines

Metal cutting machines just introduced by the DeWalt Products Corporation, Lancaster, Pa., utilize the overhead principle and are designed to use either saw blades or abrasive wheels directly driven from the motor shaft or by back gear, thus permitting two speeds to meet the requirements of different types of cutting. Motors on the various sizes range up to a maximum of 20 hp., and the machine can be used for cutting steel tubes, shapes, angles and flat stock up to a wall thickness of ⅛ in., with saw blades and ferrous metals, and such steel alloys as stainless and high carbon steel up to a thickness of 3 in. with abrasive wheels. The cutting tool travels parallel to the table above the work, and will make cuts up to 24 in. wide. Special machines will be built to make cuts to 33 in. wide.

The same machine may be equipped with saw blades for cutting non-ferrous metals such as copper, aluminum, brass, etc., up to several inches thick and up to 24 in. wide. This cutting is done with hollow ground steel saw blades or inserted tooth saw blades.

The woodworking machine is capable of 29 different woodworking operations, most of the tools being attached directly to the motor shaft. It will handle lumber from the smallest material up to a thickness of 16 in. The arm is equipped with accurate gages for measuring horizontal angles and the motor boss is equipped with a degree dial for setting off vertical angles.

▼

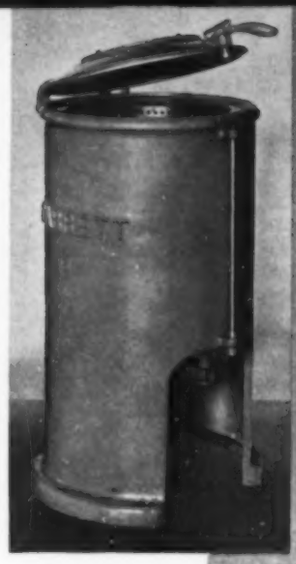
Illinois Die Filer

A die filing machine, as illustrated, has just been brought out by the Illinois Tool Works, 2501 N. Keeler Ave., Chicago. The machine base is 14x18 in., and the weight of the machine is 125 lb. The height to the top of the table is 12½ in., and the height to the top of the overarm 25 in. A ¼-hp. a.c. 110-volt, 60-cycle, 1750 r.p.m. motor drives through V-belts to give two speeds of 600 and 450 strokes per min. The length of stroke is 1½ in.

The 12-in. diameter table tilts to an angle of 20 deg. in two directions, and the hole in it has a removable bushing to make room for large files, saws or stones. The space from the center of the table to the overarm is 6¼ in., and the overarm is removed easily to handle larger work. Any type of file that can be held in a ½-in. chuck can be used. All movable parts are oiled by a forced lubricating system designed so that the oil takes the impact of the spindle.

MACHINE TOOL SHOW

At left is the "Filwhirl" enameling machine and at the right is the Grafton laboratory-type centrifugal



"Filwhirl" Enameler and Grafton Centrifugal

The "Filwhirl" enameler announced by the Leon J. Barrett Co., Worcester, Mass., was designed to do first-class enameling of various products in a centrifugal machine. It is regularly furnished as a single-spindle model, underdriven with removable pan. The driving-motor spindle extends up through the pan, which is developed for clearance with sloping sides. It is fitted with a hollow, center-sleeve post to telescope the spindle, which also passes through the pan cover. This cover rests on the outer rim of the pan. The end of the spindle where it extends through the cover is threaded, and the cover, being thus positioned, is held down by a heavy nut and operated by a two-handed wrench. A removable wire-mesh basket, closely fitting the pan, is made with a lifting bar across its center for handling in and out of the pan. This basket is light.

The Grafton type centrifugal shown in the other illustration is a self-contained motor-driven unit, size No. 0, useful both for laboratory work and for small work in regular production. The containers are 12 in. or less in diameter, and the range of motor speeds from 1,145 to 3,500 r.p.m. The motors vary from 1/6 to ½ hp. This machine was designed for small watch parts and similar parts.

Prosser Widia Grinder for Carbide Tools

Announcement is made by Thomas Prosser & Son, 15 Gold St., New York, N. Y., of a line of Prosser Widia Grinders for cemented carbide tools and tool bits. The grinders in this line are furnished in three sizes and were designed to provide tools which could be used in the average shop to regrind cemented carbide tool bits and tools in not over 5 min., and at low cost.

The Model A grinder, which is the one illustrated, is a light machine for sharpening tool bits up to ⅝ in. square. It is driven by an adjustable-speed, ball-bearing, totally-inclosed, dust-proof motor. The adjustable tables, which can be set to the exact angles desired, are planed and slotted, and a combination protractor and diamond holder is furnished as standard equipment.

The grinder has two 3-in. cup wheels, one for roughing and one for fine finishing. The latter may be either a fine silicon carbide wheel or a diamond impregnated wheel. If the diamond wheel is used, the machine can be fitted with a wick for lubricating it.

Two heavier models are also included in this line—Models B and C. The C model has a ½-hp. motor with ample power to employ 10-in. wheels for grinding all usual tools. The average tool can be reground in not over 5 min. Motors are reversible so that roughing and finishing of both right- and left-hand tools can be done conveniently, with the wheel always rotating toward the cutting edge. Roughing is done on a straight wheel providing line contact and rapid metal removal. A cup wheel is provided for finishing so as to produce a flat face and keen edge without nicks. The wheel is mounted on a steel back so that it can be used up practically completely.

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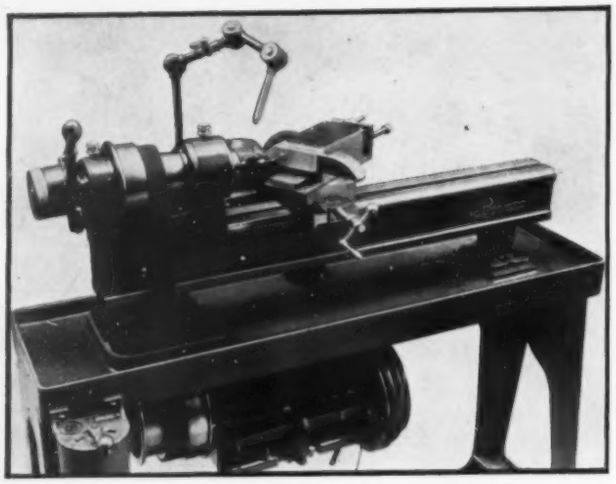
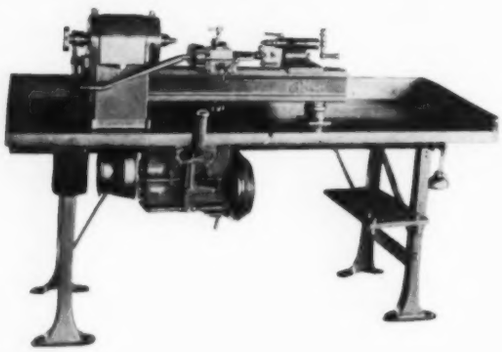
"Hy-Lift" 5-Ton Truck

The Baker-Raulang Co., Cleveland, Ohio, is presenting a 5-ton "Hy-Lift" truck having a streamlined appearance which is secured by the elimination of all sharp angles and placing all control and operating mechanism possible within the battery compartment inclosure.

Hoisting is accomplished by two double alloy steel roller chains, each having a capacity of 46,000 lb. The hoist unit is a quadruple reduction spur gear unit, having all shafts either ball or roller bearing mounted. The main frame is of ½-in. flame cut high-carbon steel plate. This truck can be furnished in any height of lift or platform length desired. A compensating mechanism holds the axle in alignment and prevents road shocks reaching the steering mechanism.



Left—Open-head lathe equipped with a motor-driven automatic slide rest



Right — Closed-head lathe which has a maximum spindle speed of 2,000 r.p.m.

Rivett No. 505 Lathes

Two models of the No. 505 lathe will be exhibited by the Rivett Lathe & Grinder Corp. Brighton, Boston, Mass. In the inclosed head design the machine is equipped with Timken precision roller bearings and maximum spindle speed is 2,000 r.p.m. It can be built, however, with or without the inclosed head. The lathe is mounted on the unit bench and has an endless flat belt drive from the speed-box motor drive below. This drive gives 18 spindle speeds, forward and reverse. Hand lever control and automatic brake are fitted. The compound slide-rest has a thread cutting attachment. Jack pedestals proved three-point mounting for the bed.

The open-head ball-bearing lathe operates at 4,600 r.p.m. It is mounted on an oil pan and floor legs and has endless flat belt drive from the Rivett speed-box motor drive that gives 18 spindle speeds both forward and reverse. The motor-driven automatic universal slide-rest is designed to turn automatically any desired angle. Tungsten-carbide or diamond cutting tools can be used to get an extremely fine finish.

Van Norman Millers

The No. 32 Universal and the No. 22 Universal, latest additions to the line of milling machines built by the Van Norman Machine Tool Co., Springfield, Mass., have greater range and handle larger work at higher speeds than any previous machines the company has built. Since these machines are intended not only for toolroom and pattern shop use, but for short-run production milling as well, both have power feeds in each direction.

Table travel on the No. 22 is 27½ in. with table cross feed of 10¾ in. The knee has a travel of 17½ in., and the ram movement in and out on the column is 19 in. Spindle speeds run up to 1,100 r.p.m., and table feeds to 15⅞ in. per min.

On the No. 32 machine, table travel is 37½ in., with a cross feed of 10¾ in., and the knee has a travel of 23½ in. Speeds and feeds are the same as on the smaller No. 22 model. Quick-adjusting attachments on both machines adapt them for drilling, boring, profiling, high-speed routing, and for cutting spirals and compound angles.

Van Norman No. 22 Miller

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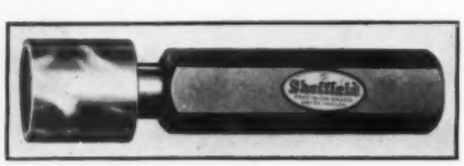
A shadow pattern shows the quality of lapping



Sheffield Precision Lapped Plug Gages

The Cimatool Co., East Third St. at June, Dayton, Ohio, will exhibit "Sheffield" precision lapped plug gages in both straight and tapered styles. The Sheffield lapping operation removes all grinding cuts by leveling off the blunt ridges between them. It also removes the temper drawn shell present after grinding. Under a high-powered microscope the fine lapping cuts show equal distribution and crossed paths. The lapping can be recognized by the peculiar shadow pattern and curved highlights thrown on the gage surface itself. Gaging tests have shown that this type of lapping is longer lived.

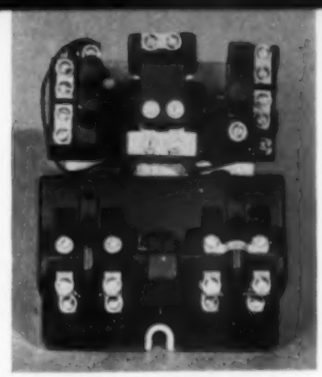
MACHINE TOOL SHOW

Westinghouse Contactors

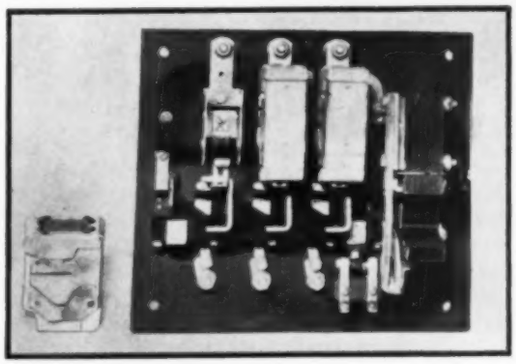
Suitable for machine-tool applications, a line of 15- and 25-amp. contactors is announced by the Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa. Confinement of the arc within the "De-ionizing" chamber permits a compact design for built-in applications. Double-break silver contacts are used. A shock-proof vertical lift solenoid prevents closing due to tilting, sudden jolts, or bumping.

Flexible in application and suitable for built-in use, the 100–150 ampere "De-Ion" contactors have a high rupturing capacity which permits long contact life under repeated operations and abnormal conditions. They are compact, shock-proof, quiet operating and may be connected front or back. The contactors provide a rolling and sliding contact on closing with a high contact pressure.

The contactors utilize an E-type magnet with the armature travel essentially vertical. Jarring or bumping cannot cause accidental closing. The assembly contactor on its U-shaped steel frame can be easily mounted on a steel base.



Right—The 15-25 amp. contactor for built-in applications on machine tools. Below—High rupturing capacity is provided in this 100-150 amp. "De-Ion" shock-proof contactor



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Williams "Agrippa" Tool Holder

The threading tool holder illustrated has been added to the "Agrippa" line of tool holders manufactured by J. H. Williams & Co., 75 Spring Street, New York, N. Y. It is made in two sizes and designated by the Nos. 150 and 151. The high speed steel formed-cutter is ground to an included angle of 60 deg. and is backed off for proper clearance. For resharpening the cutter it is necessary to grind the top edge only. A hardened set screw bearing against the rear flat edge which is eccentrically formed, provides positive and accurate adjustment.

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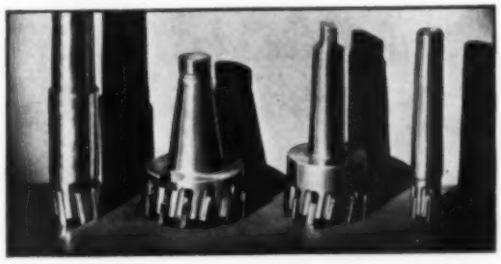
Ingersoll "Zee-Lock" Cutters

The "Zee Lock" cutter blade, developed by the Ingersoll Milling Machine Co., Rockford, Ill., which was particularly designed for face mills, has now been applied to inserted-blade end mills. The blade is positively locked in the cutter body by a Z-shaped wedge. This wedge is shaped so that in addition to locking the blade, it permits the blade to be adjusted automatically in two directions. This adjustment is mostly outwardly on the diameter but, also, a slight amount along the face.

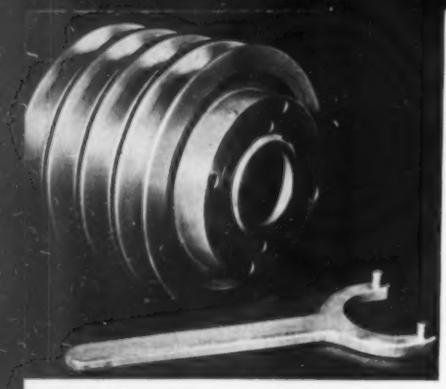
The renewable cutter blades may have tips of high-speed steel, cobalt high-speed steel, "J" metal or cemented carbide, but the remaining portion of the blades is of forged and heat-treated, chrome molybdenum steel. This makes a cutter which compares in cost with the solid cutter in the small sizes and is somewhat cheaper in the larger sizes. The replacement cost of a new set of blades is considerably less than for a solid cutter.

End milling cutters are made as small as 1½ in. in diameter. They are furnished with blades of suitable thickness or spacing for either roughing or finishing operations. Cutter housings with an extended body are obtainable.



Ahlberg Pillow Blocks

A line of pillow blocks or bearing housings, designated by the initials CJB is being announced by the Ahlberg Bearing Co., 321 E. 29th St., Chicago. These blocks are available in the so-called unit type for normal and medium duty, and in the ball and socket type for standard and heavy duty, thus providing two additions to the present line of light-duty pillow blocks designated as EC. The complete line permits a selection of 9 capacities for a given shaft size and inch dimensions, and four additional ones for metric shafts. All types are fitted with felt seals to prevent entrance of foreign matter.



Pitch diameter of the sheave can be changed for speed variation

Allis-Chalmers V-Belt Sheave

An improvement in power transmission by V-belts is offered by the Allis-Chalmers Mfg. Co., Milwaukee, Wis., in the form of the "Vari-Pitch" Texrope Sheave. The pitch diameter of this new sheave can be changed so as to give variations in speed as high as 15 to 25 per cent per sheave. If both sheaves of a drive are of this new type, the range of variation can be doubled. The adjustment is simple and takes but a few seconds.

These sheaves are made in two multi-groove types, stationary and motion controlled. The stationary controlled type is recommended for applications that require occasional change of speed, whereas the motion controlled type is better suited for applications that require frequent quick changes.

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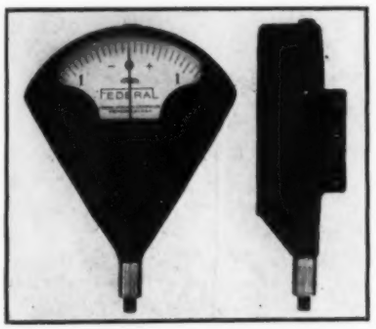
Yale "Pul-Lift"

Designed for a wide range of serviceability in both horizontal and vertical positions, the "Pul-Lift," introduced by the Yale & Towne Mfg. Co., Philadelphia, Pa., is capable of lifting loads up to 6 tons. A Weston type of self-actuating load brake holds the load firmly at all times. The lifting mechanism consists of a ratchet and pawl on the smaller capacity models, and a gear reduction on the larger capacities. Construction permits the operator to select a handle position most convenient.

Load hooks are of heat-treated drop-forged steel. They serve as a protection to the rest of the mechanism, inasmuch as they will open before any vital parts are overburdened. Moving parts are completely inclosed so that they may be operated in grease and protected from injury. Through the use of heat-treated, chrome-nickel steel gears, sprockets and load brake parts, the Pul-Lift is made light in weight.



Federal Indicator

Eye wandering is eliminated and the inspector's attention is focused on a limited dial close to the zero point in the "Clear Vision" indicator announced by the Federal Products Corporation, 1144 Eddy St., Providence, R. I. The inspector merely spots the zero point and notices the deviation of the needle, thus eliminating any chance for confusion when rapidly reading the indicator. The dial is limited in scope, there being only twelve graduations representing ten-thousandths, plus or minus, instead of the usual round dial. In the Model 866, the graduations are spaced at 0.097 in., in the larger Model 95, at 0.200 in.

Farval Lubricator

The Farval Corporation, Detroit, Mich., announces a new full automatic system of lubrication for machine tool equipment as an aid to increased production, better finish, reduced power consumption, lowered maintenance costs, elimination of shutdowns for repairs, and prolonged life of equipment. This system of lubrication features a fully enclosed motorized pumping unit as illustrated. The complete unit has but two moving parts; all check valves, stuffing boxes, etc., have been eliminated.

Type C lubricator for automatic systems

Positive, piston displacement valves of different capacities, located at the bearings, control the delivery of lubricant under high pressure and are connected to the central pumping unit by means of a single main line of tubing. An adjustable timer permits variation of the frequency of operation from five minutes to two hours and may start and stop with the machine.

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Buckeye Portable Electric Tools

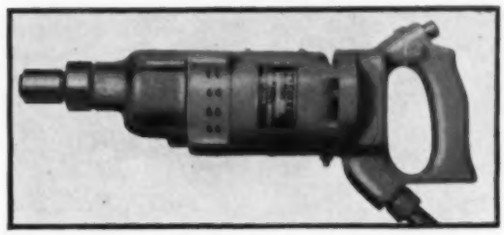
Three additions to the line of high frequency electric tools manufactured by the Buckeye Portable Tool Co., Dayton, Ohio, are announced. The No. 21-S Screwdriver is adapted for use in automobile body plants and similar places. It combines light weight and speed with the necessary power and is equipped with a positive clutch which can be supplied for reversible operation. The switch handle and motor housing are insulated, and the machine is ball bearing throughout. The speeds are 500, 750 and 1000 r.p.m. The capacity of the machine is for No. 12 and No. 14 screws.

For engine assembly and for like work on axles, trucks and tractors, the No. 60 N Nut Runner has

MACHINE TOOL SHOW

been designed. It has a so-called "shockless" clutch which drives the nut tight without shock to the operator. The Twist type switch handle is obtainable for operation in both directions. Speeds available are 300, 500 and 750 r.p.m, and the capacity is for ⅝-in., 9/16-in., and ½-in. nuts. The length of the tool is 18 in.

The No. 51-5400 High Frequency Grinder is a light weight tool, available in two speeds; 5400 or 8500, and uses either 4-in. vitreous or organic bonded emery wheels, and a 4-in. buffiing wheel.



A "shockless" clutch is used in the Buckeye No. 60 N nut runner

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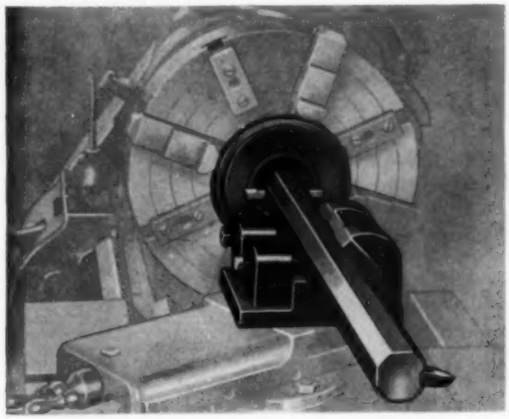

Kershaw Boring Tool

The boring tool illustrated was designed by F. A. Kershaw, Kent, Ohio, to reduce the cost of boring on engine lathes. The gray iron holder has a 90-deg. groove machined in it with the faces of the groove at 45 deg. to the vertical, the center of the groove being at the proper height for the lathe on which the tool is to be used. Provision is made for setting the holder parallel with the spindle, when the compound rest is set at 0 deg. or at 30 deg. for thread cutting, and the clamp nut is so attached that in either position the holder can be put in place or removed as easily as the regular tool post.

When the tongue on the holder is properly fitted to the slot in the compound rest, the holder with the tool clamped in place may be removed and replaced with a considerable degree of accuracy. By reversing the holder the bar is brought out beyond the tool post for full swing turning with an overhanging bar.

A hardened liner is attached to the holder for use in clamping the smaller bars; it is used flatwise or edgewise, as required, and reduces the travel of the clamping screws to a very small amount. The rigidity of the tools makes them particularly suitable for carbide tools.

The bars are made in six sizes from ½ in. to 1¾ in. The No. 2 holder taking the first five sizes, and the No. 3 all sizes. The bars are made of crucible tool steel octagon in form, heat-treated and drawn to 300 Brinell. A hole is broached in each end of the bar to receive the cutting tools; one hole at 90 deg. for recessing, undercutting, inside facing or other work of that nature, and the other at 30 deg. so that the clamping screw can be made longer and brought closer to the cutting end of the bit.

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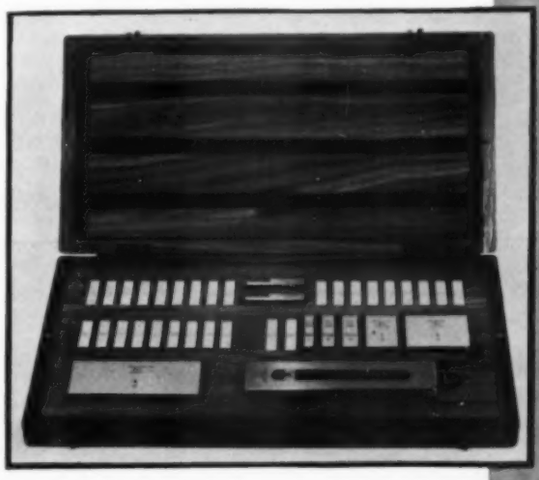
No. 2 Ford-Johansson Gage Block Set

Illustrated is the new set of No. 2 Johansson gage blocks just announced by the Johansson Division of the Ford Motor Co., Detroit, Mich.

This set of 35 gage blocks and three accessories will make consecutive 0.001 in. steps from size 0.300 in. up to 8 in. The blocks may be used to set amplifiers, comparators, visual gages and mechanical gages, as well as snap gages. They are also useful for checking micrometers, production gages and inspection gages, and with the use of accessories are available to check inside and outside measurements and group thread leads. With other accessories they can be used for scribing lines and spacing holes within 0.0001 in. They are packed in an attractive case.



Measurements between 0.30 and 8 in. can be made in 0.001 in. steps with this set

Show in Print Index

Abrasive Machine Tool Co. 686
No. 3 B reciprocating surface grinder

Acme Machinery Co. 688
No. 35 all-steel forging machine

Ahlberg Bearing Co. 713
C J B pillow blocks

Allis-Chalmers Mfg. Co. 714
"Vari-Pitch" texrope sheave

American Tool Works Co. 650
Multi-production engine lathe, radial drill and improved shaper

Arter Grinding Machine Co. 708
Hydraulic rotary surface grinder and piston ring grinder

Baker-Raulang Co. 711
"Hy-Lift" 5-ton truck

Bausch & Lomb Optical Co. 684
Contour measuring projectors

W. F. & John Barnes Co. 682
Finish-boring cylinder block machine and hydraulic units

Leon J. Barrett Co. 711
"Filwhirl" enameler and "Grafton" centrifugal

Black & Decker Mfg. Co. 707
"Junior" electric drill and "Super Service" sander

Blanchard Machine Co. 665
No. 18 surface grinder

Bridgeport Safety Emery Wheel Co. 653
No. 75 shear blade grinder

Brown & Sharpe Mfg. Co. 658
No. 12 plain and No. 0 "Omniversal" universal milling machines and No. 5 hydraulic surface grinder

Bryant Chucking Grinder Co. 674
No. 4 automatic and No. 16 chucking grinders

Buckeye Portable Tool Co. 715
High-frequency electric tools

Buhr Machine Tool Co. 705
"Hydroscru" power unit and two-way drilling machine

Carborundum Co., Hutto Machine Division 696
Cylinder and connecting-rod hones, vertical honing machine

Century Electric Co. 679
Special machine tool motors

Cimatool Co. 712
Sheffield lapped plug gages

Cincinnati Bickford Tool Co. 681
High-speed "Super-Service" radial drill

Cincinnati Lathe & Tool Co. 671
Heavy-duty and toolroom lathes

Cincinnati Milling Machine and Cincinnati Grinders, Inc. 706
Roll grinder

Cincinnati Shaper Co. 692
High-speed shapers and squaring shear

Cleereman Machine Tool Co. 710
C-1½ and C-2 upright drilling machines

Colt's Patent Fire Arms Mfg. Co. 657
Model MR-8 "Autosan" metal parts cleaning machine

Dayton Rubber Mfg. Co. 675
"Day-steel" cast machined pulleys and "Day-coil" oilproof V-belt

De Walt Metal Products Corp. 710
Metal-cutting and wood-working machines

Diamond Machine Co. 704
Type G 4 surface grinder

Eastern Machine Screw Corp. 677-687
"H & G" solid adjustable diehead and Model 2 threading machine

Ex-Cell-O Aircraft & Tool Corp. 648
Thread grinder, carbide tool grinder, hydraulic upright drilling machine and hydraulic power unit

Farrel-Birmingham Co. 672
Improved Farrel-Sykes gear generators

Farval Corp. 714
Type C lubricator

Federal Products Corp. 714
"Clear Vision" dial indicator

Ford Motor Co., Johansson Division 715
No. 2 Johansson gage block set

Fosdick Machine Tool Co. 668
Radial and sensitive drilling machines

Foster Machine Co. 694
No. 3 "Fastermatic" and No. 1 and 1¼ in. turret lathes

Geometric Tool Co. 673
No. 12 hand-operated threading machine

Giddings & Lewis Machine Tool Co. 666
No. 350-T and No. 350 FQ horizontal boring, drilling and milling machines

Gisholt Machine Co. 669
No. 3 turret lathe

Gits Bros. Mfg. Co. 678
Oil tank and multiple oiler

Goss & De Leeuw Machine Co. 663
Five-spindle chucking machine

Gould & Eberhard 680
No. 72-H manufacturing-type gear hobber and toolroom shapers

G. A. Gray & Co. 652
Milling planer

Greenlee Bros. & Co. 709
Four-spindle automatic screw machine

Hannifin Mfg. Co. 702
"Hi-Power" portable hydraulic riveter

Heald Machine Co. 641
Nos. 45 and 49 "Bore-Matic" boring machines; No. 72-A gap internal and No. 74 plain internal grinders

Henry & Wright Mfg. Co. 698
Automatic press, dieing machine and stock reel

Hoefer Mfg. Co., Inc. 645
Hydraulic feed drilling unit

Hutto Machine Div., The Carborundum Co. 696
Cylinder and connecting-rod hones; honing machine

Hydraulic Press Mfg. Co. 670
"HPM" Fastraverse production hydraulic presses

Illinois Tool Works 710
Die filing machine

Ingersoll Milling Machine Co. 713
"Zee-Lock" end mills

Jones & Lamson Machine Co. 689
Saddle-type turret lathes

Kearney & Trecker Corp. 690
Models H and K milling machines

F. A. Kershaw 715
Boring tool

Landis Tool Co. 647
Type C 10-in. semi-automatic grinder

R. K. LeBlond Machine Tool Co. 664
11-in. high speed engine lathe

Lucas Machine Tool Co. 703
No. 41 horizontal boring, drilling and milling machine

Madison-Kipp Corp. 665
No. 6 die-casting machine

Mattison Machine Works 662
Improved surface grinders

Motor Improvements, Inc. 691
Double-cased "Purolator" oil filter

Murchey Machine & Tool Co. 679
Type C universal combination tap

National Acme Co. 646
Single-spindle automatic screw machine

New Britain-Gridley Machine Co. 644
Nos. 12A, 14, 16 and 38 chucking machines and hydraulic power unit

Norton Co. 654-656
Nos. 1 and 2 tool and cutter grinders, 6x18-in. toolroom surface grinder and No. 10-U lapping machine; crankshaft and camshaft grinders and Hyprolap production lapping machine

Ohio Machine Tool Co. 693
"Dreadnought" 5- and 6-in. horizontal boring, drilling and milling machine

O. K. Tool Co. 679
Shankless toolbit and holder

Oliver Instrument Co. 649
Face mill grinder

Oster-Williams 692
Tom Thumb pipe machines

Peerless Machine Co. 707
6½x6½-in. metal saw

Porter-Cable Machine Co. 673
"Carbo" hydraulic lathe

Potter & Johnston Machine Co. 664
No. 7-D automatic chucking machine

Producto Machine Co. 662
No. 28 cam-type milling machine

Thomas Prosser & Son 711
Cemented-carbide tool grinder

Reeves Pulley Co. 685
"Hydraumatic" hydraulic control for variable speed transmission

Rivett Lathe & Grinder Corp. 712
No. 505 lathes

Rotor Air Tool Co. 676
High-cycle electric portable tools, Type B-1 sander, Type E-50-C drill and 6-in. Type D-0-2 grinder

Seneca Falls Machine Co. 700
Lo-Swing "Imp," Model U and "Unit-lathe," "Star" centering machine, Seneca Falls work driver

Sundstrand Machine Tool Co. 660
10-in. "Stub" lathe, No. 2 "Electro-mil" milling machine and hydraulic drill unit

United States Electrical Tool Co. 667
Model 65 adjustable-speed floor grinder

Universal Boring Machine Co. 659
"400 Series" horizontal boring, drilling and milling machines

Thompson Grinder Co. 704
Type B-special surface grinder

Van Norman Machine Tool Co. 712
Nos. 22 and 32 universal milling machines

V & O Press Co. 643
No. 410 high-speed notching press

Warner & Swasey Co. 699
Improvements for turret lathes

Westinghouse Electric & Mfg. Co. 713
15-25 amp. contactor and 160-150 amp. contactor

J. H. Williams & Co. 713
"Agrippa" threading toolholder

Whitney Metal Tool Co 675
No. 128 heavy-duty punch

Yale & Towne Mfg. Co. 714
"Pul-Lift" pulling and hoisting device

TRADE PUBLICATIONS

How Equipment Manufacturers Provide Against Inadequate Specifications in Customers' Orders. A survey of the problem "What methods are used by manufacturers, particularly machinery manufacturers, to obtain the necessary details regarding customers' orders so that the goods when shipped will meet the customers' requirements," has been conducted by the Policyholders Service Bureau of the Metropolitan Life Insurance Co. The report points out that although the methods used by manufacturers vary and are governed to a great extent by the type of products manufactured, they may be grouped in four general classes: (1) the direct contact method, through personal calls or correspondence, (2) the contract method, (3) the data sheet method, and (4) the "text book" catalog method.

Insulating Material. More than 50 of the J-M insulating products, are described and illustrated in a booklet entitled "Barriers to Industrial Waste" which has been published by Johns-Manville, 22 East 40th St., New York, N. Y. A table of recommendations for insulating materials is included.

Introduction of New Industrial Products. A pamphlet entitled "Introduction of New Industrial Products" prepared by O. C. Holleran of the Marketing Research and Service Division, Department of Commerce, Washington, D. C., gives the essential factors which should be taken into consideration in bringing out any new industrial product. Price, 5 cents.

Lathes. Bulletin No. 171, published by the Monarch Machine Tool Co., Sidney, Ohio, presents its specially tooled semi-automatic engine lathe. Drawings illustrate various tooling set-ups.

List of Government Purchasing Offices. An unofficial list of the purchasing offices of the Federal Government, including not only the main offices in Washington, but also the field purchasing agencies all over the United States, has been prepared by the Machinery Division, Bureau of Foreign & Domestic Commerce, Washington, D. C. This list may be obtained free of charge.

Switches. Colt's Patent Fire Arms Manufacturing Co., Hartford, Conn., has published a Colt-Noark Electrical Products catalog describing in detail all of its Colt-Noark industrial safety switches, also its new line of motor starters.

Meehanite Metals. The Meehanite Metal Corporation, Pittsburgh, Pa., has issued Bulletin No. 5., containing photomicrographs showing the graphite formation in cast iron, semi-steel and Meehanite. It also contains a description of the structure of Meehanite.

Lubrication Equipment. The Alemite Corp., Chicago, Ill., has announced a revised mid-year 1935 Alemite Powergun Equipment Catalog. In 25 pages are presented, in natural colors, all equipment and accessories necessary for every kind of a lubrication job. Full details and specifications are given, and all prices are quoted.

Tooling Costs. The Cimatool Co., East Third & June Sts., Dayton, Ohio, has published a booklet on "How Tooling Costs are Being Reduced."

Once you have determined the size, shape and physical characteristics of the steel you require for your particular operations, you can depend on WYCKOFF to meet your Cold Drawn Steel needs with the exactness of a laboratory formula.

In fact every length of WYCKOFF Cold Drawn Steel is the product of progressive scientific metallurgical control from the molten metal to the finished bar—every length backed by a complete history of its physical and chemical "pedigree".

Absolute uniformity, bar after bar is the result . . . correct in analysis, size, straightness, with a smooth, bright surface and superior machining qualities that enables you to still further reduce your production costs.

WYCKOFF DRAWN STEEL COMPANY

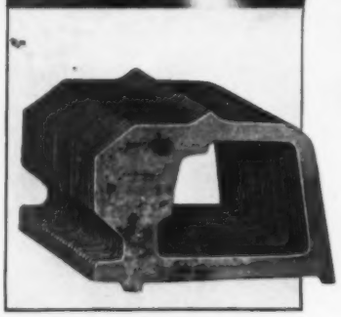
General Offices: First National Bank Bldg., Pittsburgh, Pa.
Mills at Ambridge, Pa. and Chicago, Ill.
Manufacturers of Cold Drawn Steels
Turned and Polished Shafting Turned and Ground Shafting

PORCELAIN ENAMEL. A booklet, published by the Porcelain Enamel Institute, 612 North Michigan Ave., Chicago, Ill., describes the origin, nature, application, uses and advantages of porcelain enamel. The booklet is profusely illustrated, showing various applications of the products.

PUMPS. The 44-page catalog, published by the American Engineering Co., Philadelphia, Pa., contains over 100 illustrations, charts, tables, drawings and engineering data indicating the construction, operation, application and specifications of Hele-Shaw pumps, motors, transmissions, regulators, differential valves and pipe testing machines.

POWER TRANSMISSION MACHINERY. The Medart Co., St. Louis, Mo., has published Catalog No. 56-T, presenting its line of power transmission equipment. The catalog contains 144 pages of illustrations and specifications.

Side plates for paper box machine.



Machine parts cut from 3/8" plate.

Ryerson Flame Cut Plates *and* Billets Save Time *and* Money

You can fabricate most any part from these flame cut rolled steel sections.

Manufacturers using Ryerson Flame Cut Plates and Billets are saving both time and money. Strong rolled steel parts are quickly and accurately cut from mild, high carbon or alloy quality steel. Experienced Ryerson operators with modern and complete equipment can produce any number of pieces to the most exacting specifications.

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Hot Rolled and Cold Drawn Alloys
Standard S.A.E. alloys and special analyses

Heat Treated Alloys
Guaranteed physical properties.

V. D. Steel
A remarkable water hardening steel.

Cold Finished Steels
Shafting and screw stock, for every purpose.

Tool Steels
Various types for specific purposes.

WRITE FOR STOCK LIST.

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Chicago, Milwaukee, Philadelphia, Cincinnati, Cleveland, Detroit, Buffalo, Boston, St. Louis, Jersey City.

RYERSON STEEL-SERVICE

SQUARING SHEARS. Bulletin No. 72-E, published by the Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y., presents its line of power squaring shears for $\frac{1}{4}$ in. and lighter capacities. Specifications and dimensions are given for twelve models.

STEEL. The Timken Steel & Tube Co., Canton, Ohio, has issued a revised copy of their listing sheet "Timken Steel Specifications." The sheet includes specifications for Krupp, Ni-Cr-V and the special corrosion and heat-resisting steels.

TAPS, DIES AND SCREW PLATES. The Winter Bros. Co., Wrentham, Mass., has issued a 112-page catalog presenting its line of taps, dies and screw plates. The booklet contains 23 pages of useful information and data for users of threading tools.

TAP CHART. The R. G. Haskins Co., 4630 Fulton St., Chicago, Ill., is offering to users of tapping equipment, a "Per Cent of Thread Chart." This chart has been prepared to give more detailed information on percentages of thread that can be obtained using certain sizes of tap drills.

THE THIRTY-HOUR WEEK. The National Industrial Conference Board, Inc., 247 Park Ave., New York, N. Y. has published a booklet, entitled "The Thirty-Hour Week". This is a summary of the available facts regarding the probable effects of a thirty-hour work limitation on employment, production costs, prices, purchasing power, and output per worker.

THREADING MACHINES, Die Heads and Collapsible Taps. "Let's Talk About Performance," a catalog issued by the Landis Machine Co., Inc., Waynesboro, Pa., presents to users of thread-cutting equipment a complete story of Landis performance. Photos show typical installations of threading equipment in various shops.

TOOLS. In Catalog 35, the Bonney Forge & Tool Works, Allentown, Pa., describes its line of wrenches, pliers, hammers, punches and chisels. Eight pages are devoted to wrenches for use in special applications, such as automobile and aircraft engines.

TUBING. The Summerill Tubing Co., Bridgeport, Pa., has issued a folder presenting some unusual uses for tubing.

VALVES. A 52-page catalog, No. 21, issued by the Fairbanks Co., New York, N. Y., presents its line of check, gage, globe, angle and cross valves. Cross-section views show details of construction. Specifications and price list are included.

ABRASIVE DISKS. "Besly Titan Steelbacs," a publication issued by Charles H. Besly & Co., 118-124 N. Clinton St., Chicago, Ill., presents a line of abrasive disks designed to eliminate the process of cementing and pressing on cloth-back abrasive disks to steel disk wheels.

ARC WELDING. The Hobart Bros. Co., Troy, Ohio, has prepared a catalog in which are briefly outlined a few of the modern applications of electric arc welding in many industries.

BEARINGS. The Gwilliam Co., 360 Furman St., Brooklyn, N. Y., has issued a catalog describing its line of ball and roller bearings. It contains illustrations with lists of standard types and sizes.

BEARINGS. A 32-page catalog describing ball and roller bearing transmission appliances has been released by SKF Industries, Inc., Philadelphia, Pa. The book shows load ratings and diagrams of mountings for SKF ball and roller bearing pillow blocks, flanged housings, take-up boxes, post and drop hangers, floor stands, replace boxes, locknuts and lockwashers. Seven pages are devoted to a discussion of bearing problems, aids in the selection of ball and roller bearings, and dimensional and load data.

BELTING. The Boston Woven Hose & Rubber Co., Cambridge, Mass., has published a booklet entitled "Continuous Vulcanization of Transmission Belting." It is an announcement and description of a new process of continuous vulcanization by which "BWH" belts are made.

BLOWERS. Bulletin 21-B-17 descriptive of Victor-Acme rotary positive blowers has been issued by Roots-Connersville Blower Corporation, Connersville, Ind.

BORING, DRILLING AND MILLING MACHINES. Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., has published catalogs describing four different models of its high power, precision, horizontal boring, drilling and milling machines.

FORGED TOOLS. The Division of Simplified Practice, U. S. Department of Commerce, has published Simplified Practice Recommendation R17-35 on Forged Tools. It is for sale by the Superintendent of Documents, Washington, D. C. Price 10 cents.

GEAR MOTORS. The Allis-Chalmers Mfg. Co., Milwaukee, Wis., has published Leaflet 2203 describing compact self-contained speed reducers, with integral or attached motors that permit low-speed drives with high over-all efficiency.

GEARS AND SPEED REDUCERS. A booklet issued by the Foote Gear Works, Inc., 1301 S. Cicero Ave., Cicero, Ill., contains engineering data relative to speed reducers and gearing. Descriptions are also given of a newly patented motorized worm gear reducer.

HEAT-TREATING FURNACE. The American Gas Furnace Co., Elizabeth, N. J., has published a folder describing its improved No. 16F toolroom oven furnace. Characteristics of construction and specifications are included.

METAL SPRAYING EQUIPMENT. The Metallizing Co. of America, Inc., Los Angeles, Cal., has prepared a four-page pamphlet covering the uses of metal spraying equipment on general maintenance applications. This pamphlet has photographs of metallizing jobs

• *Shown below, at right:* New Oilgear Fluid Power Feed. Note flanged mounting, as integral machine part . . . Inside pump, eliminating hazard and improving appearance . . . Self-contained; auxiliary valves and tubing are integral with pump . . . Many other exclusive features.

NEW FLUID POWER FEEDS

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100 to 600% More
Rapid Traverse Speed

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Up to 50% Lower Cost

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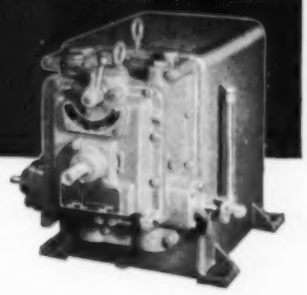
Compensated
For Speed Variations Under Temperature and Working Conditions

Get Oilgear's Big New Book. Free, of Course



• FREE! Interesting, complete Fluid Power Feed Book . . . *Shown above:* Bausch No. 1 Center Feed Multiple Spindle Drill, with new Oilgear Fluid Power Feed.

ACCEPTANCE! More and more forward-looking machine builders are improving sales with Oilgear's superb new Fluid Power Feed. More and more machine users are profiting with this Feed's great betterments. Every machine designer, builder and user should read Oilgear's big, illustrated, informative book! THE OILGEAR COMPANY, 1309 W. Bruce St., Milwaukee, Wis.

OILGEAR FLUID POWER FEEDS

[B-5561]

that have been in service a number of years and also lists many maintenance applications to which the equipment is being put.

PACKAGING MACHINES. The Gerrard Blue Book of Packaging, published by the Gerrard Co. Inc., 2915 West 47th St., Chicago, Ill., describes five models of the company's wire tying machines. Illustrations show miscellaneous applications.

PARTS CABINETS. A leaflet issued by the J. D. Warren Mfg. Co., Montpelier, Ohio, presents its line of "Economical" sectional cabinets, designed especially for taking care of small parts and supplies.

PUMPS AND COMPRESSORS. The Worthington Pump & Machinery Corp., Harrison, N. J., has published four bulletins on: Vertical centrifugal pumps, air lift pumping systems and air compressor units. Line drawings show details of construction and tables of standard ratings are included.

REAMERS AND END MILLS. The Gammons-Holman Co., Manchester, Conn., has issued a catalog presenting its line of helical reamers and end mills. Specifications and price lists are included.

SMALL TOOLS. The Scully-Jones & Co., 1905 South Rockwell St., Chicago, Ill., have published catalog No. 105, presenting their line of drilling, tapping, reaming and milling tools. Specifications and price lists are included.

SPRAY PAINTING. A 16-page loose leaf catalog on spray painting equipment and accessories has been announced by the Binks Manufacturing Co., 3114 Carroll Ave., Chicago, Ill. All necessary equipment for industrial spray finishing are listed and priced with complete specifications.

STEEL. The Illinois Steel Co., 208 South LaSalle St., Chicago, Ill., and the Carnegie Steel Co., Pittsburgh, Pa., have collaborated in the preparation of a booklet entitled "Rolled Steel for Machine Construction." It contains suggestions on the forms of steel available, short cuts to economy in buying, how rolled steel and castings may be combined, and suggestions on welding technique, stress and relief.

STEEL. The Republic Steel Corp., Massillon, Ohio, has reprinted for distribution an article on the subject of new high tensile steel by H. L. Miller, which appeared in the July, 1935, issue of Metal Progress. The article contains authentic information on this new product which promises to have a wide field of application where the requirement is for high strength steel.

THERMIT WELDING. "Thermit Welding—Industry's Master Maintenance Tool" is the title of an illustrated 15-page booklet published by the Metal & Thermit Corp., 120 Broadway, New York, N. Y. Cost data are given in a number of instances.

TIME CONTROLS. The Automatic Temperature Control Co., Philadelphia, Pa., has published a 16-page Catalog T-C, in which the controlling of time in connection with industrial operations and processes is treated. Readers are guided in their approach to the subject by analysis of specific jobs to be performed.

WELDING EQUIPMENT. The Weldit Acetylene Co., 633 Bagley Ave., Detroit, Mich., has published two circulars describing the "Weldit" gasaver and the Weldit automatic blowpipe, respectively.

in the foremost equipment at the show

In adopting Laminum precision adjustment shims the foremost machine tool manufacturers are giving users a feature that cuts maintenance costs and saves production hours throughout the life of the equipment.

Precision bearing, gear, shaft and interchangeable unit adjustments are made right at the machine . . . No longer need you remove parts (or solid shims) to the shop for filing, machining or grinding.

.002" or greater adjustments by simply p-e-e-l-i-n-g one or more laminations at a time from the Laminum shim. Sample on request.

The solid shim that p-e-e-l-s for adjustment

LAMINUM

LAMINATED SHIM CO. 2114-44th Av., Long Island City, N. Y
Cleveland Detroit Milwaukee

591

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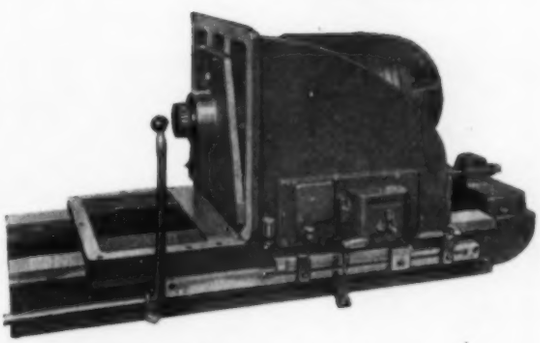
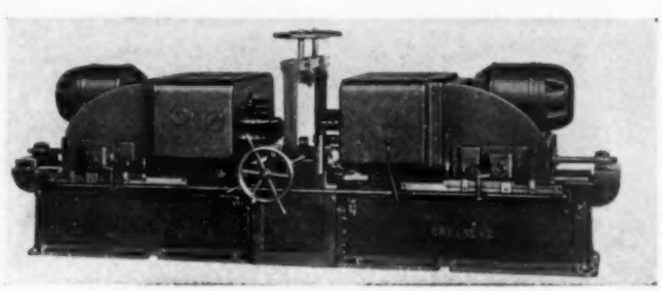
SEE OUR EXHIBIT IN BOOTH No. 902

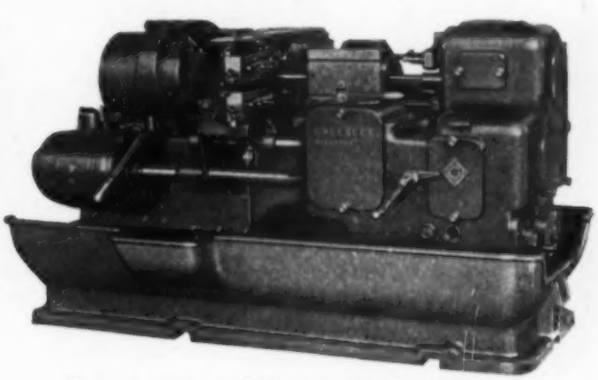
Interested in drilling, boring, reaming, tapping, and similar operations? If so, be sure to see the Greenlee Bros. & Co. exhibit in booth number 902 at the Machine Tool Show. We shall have under power one or more special machines of the general type shown below. We shall have, also, one of our Self-Contained Hydraulic Feed Drive Units and numerous photographs with related data showing how these and other Greenlee Units have been used in building machines for cutting costs and increasing production on the class of machining mentioned above. In addition, there will be a Greenlee 4-spindle Automatic Screw Machine in operation. You can see the various features in the design of this machine which shorten set-up time, speed up machining, and increase accuracy of product. There will be Greenlee engineers at our booth to give you any desired information about our products, what they have done for others, and what they can do for you. Put booth number 902 on your list of exhibits that you MUST see at Cleveland.



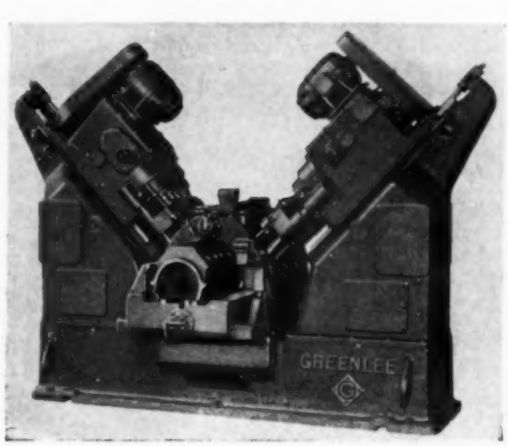
Greenlee Self-Contained Hydraulic-Feed Drive Unit. Built in 5, 10, 25, and 50 H. P. Sizes.



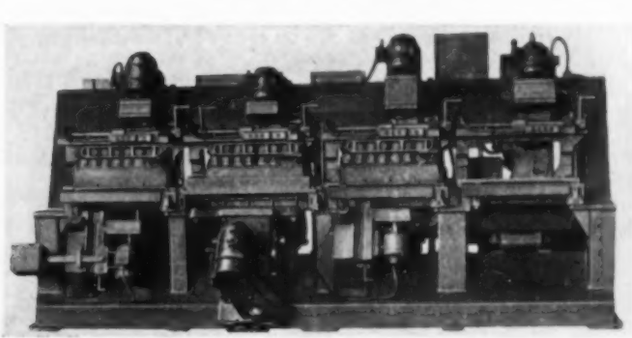
Above—Greenlee Two-Way Multiple-Spindle Boring Machine with 25 H. P. Self-Contained Hydraulic Drive Units.



Above—Greenlee 4-spindle Automatic Screw Machine. Watch it run. Ask for booklet.



Left—Greenlee Two-Way Machine, for chamfering the top and bottom of the cylinder bores in a V-8 cylinder block.



Above—Greenlee Four-Station Machine with thirteen operating units mounted at various angles.

Multiple-Spindle Drilling, Boring, and Tapping Machines

Greenlee BROS. & CO.
ROCKFORD, ILLINOIS, U.S.A.

Four-Spindle Automatics, Special Machinery for Many Purposes

AFTER THE SHOW... *WHAT?*

WHEN the train from Cleveland pulls into town, and you're back from the Show—with a bag full of catalogs and your head full of money-making, money-saving ideas—consider this fact: Taft-Peirce offers you the most direct and productive way to put those ideas to work. Taft-Peirce products and service include:

T-P Small Tools and Gages—for maintaining accuracy of the parts you turn out on your new machines.

T-P Dies, Jigs and Fixtures—for speeding production and cutting unit costs.

T-P Special Production Machines—designed and built to do automatically the operations which can be done only at high cost—or not at all—on even the latest standard machines.

T-P Contract Service—for turning out, at a definite, predetermined cost, parts or complete products to your specifications. The T-P shops will lift the entire production problem off your shoulders, may spare you the expense of adding to your plant. T-P has the men, the machines, the responsibility—manufactures parts or complete units to meet definite quality standards and to meet delivery schedules set before the work is started.

T-P Magnetic Chucks—*SUPERPOWER* chucks that have greater power, permit greater versatility of set-up, heavier cuts and faster feeds.

T-P Mechanical Audit—a study of your plant and its equipment to help you build at the lowest cost. T-P engineers are prepared to write operations, specify equipment, tools and materials, establish piece rates and design any special equipment required.

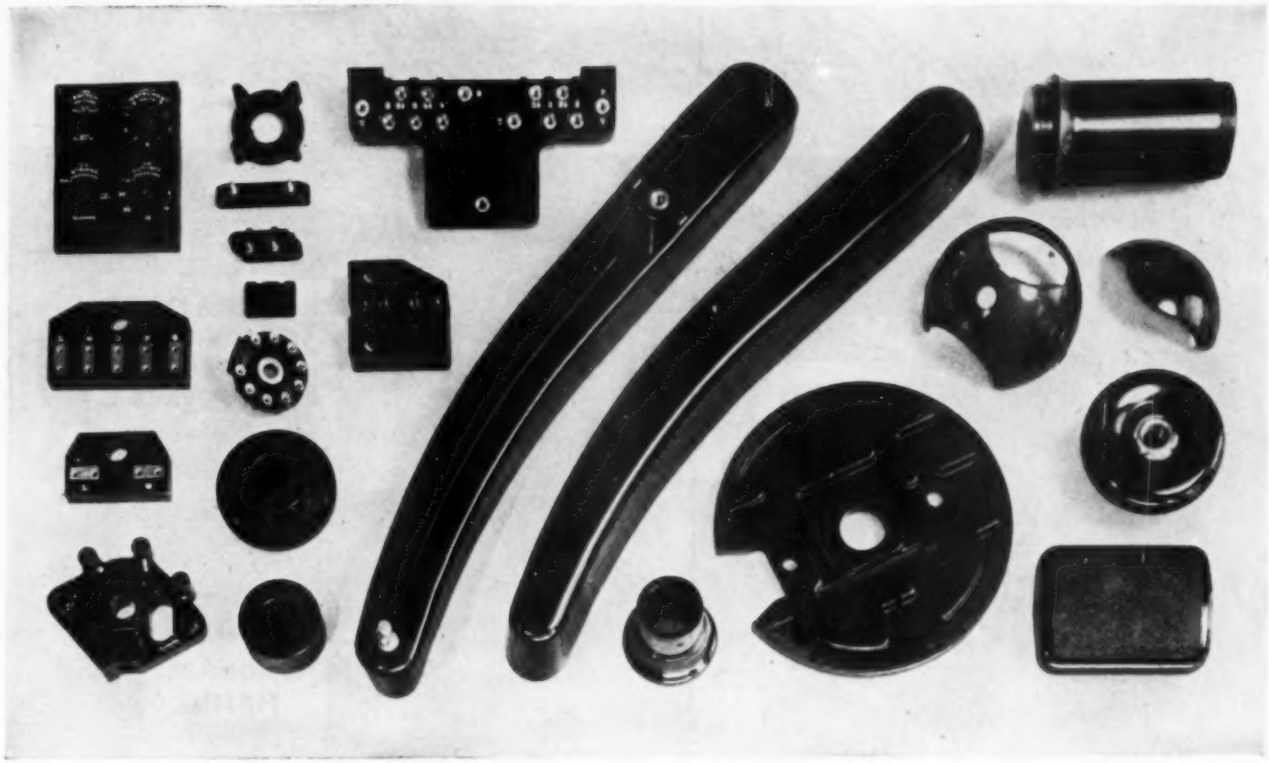
To put your cost-cutting ideas to work—*now*—put them up to Taft-Peirce Manufacturing Company, Woonsocket, R. I., U. S. A.

TAKE IT TO TAFT-PEIRCE

T P

1887

One Press Operation *completed each Part*



THIS representative group of Bakelite Molded parts provides an excellent demonstration of the adaptability of Bakelite Molded to a great variety of parts frequently formed of other materials by less simple and less economical methods. These different parts, all formed of Bakelite Molded in a press, would represent almost every type of machine operation if formed with tools.

By using Bakelite Molded such operations as stamping, punching, turning, drilling, threading, polishing, and enameling were made unnecessary. Where metal inserts were required as in the wheel hub, chair arms and terminal blocks they were firmly and permanently embedded during the molding operation. Accuracy and uniformity was assured and interchangeability of like parts pre-determined. Assembly operations were greatly simplified.

There are many varieties of Bakelite Molding Materials. All are alike in that they resist heat and cold, moisture, oils, and most chemicals. There are materials which have been produced to meet certain specific requirements, such as resistance to shock, tensile strain, severe electrical stresses and temperatures (up to 500°F). There is sure to be some one type which will meet your particular needs.

We invite manufacturers and engineers to consult us about the possibilities of Bakelite Molded for improving the quality and performance of their products, and to write for a copy of our 48-page illustrated booklet 4M, "Bakelite Molded".

Photo shows Bakelite Molded parts that solved a dozen problems for S. S. White Dental Mfg. Co., Philadelphia, Pa.

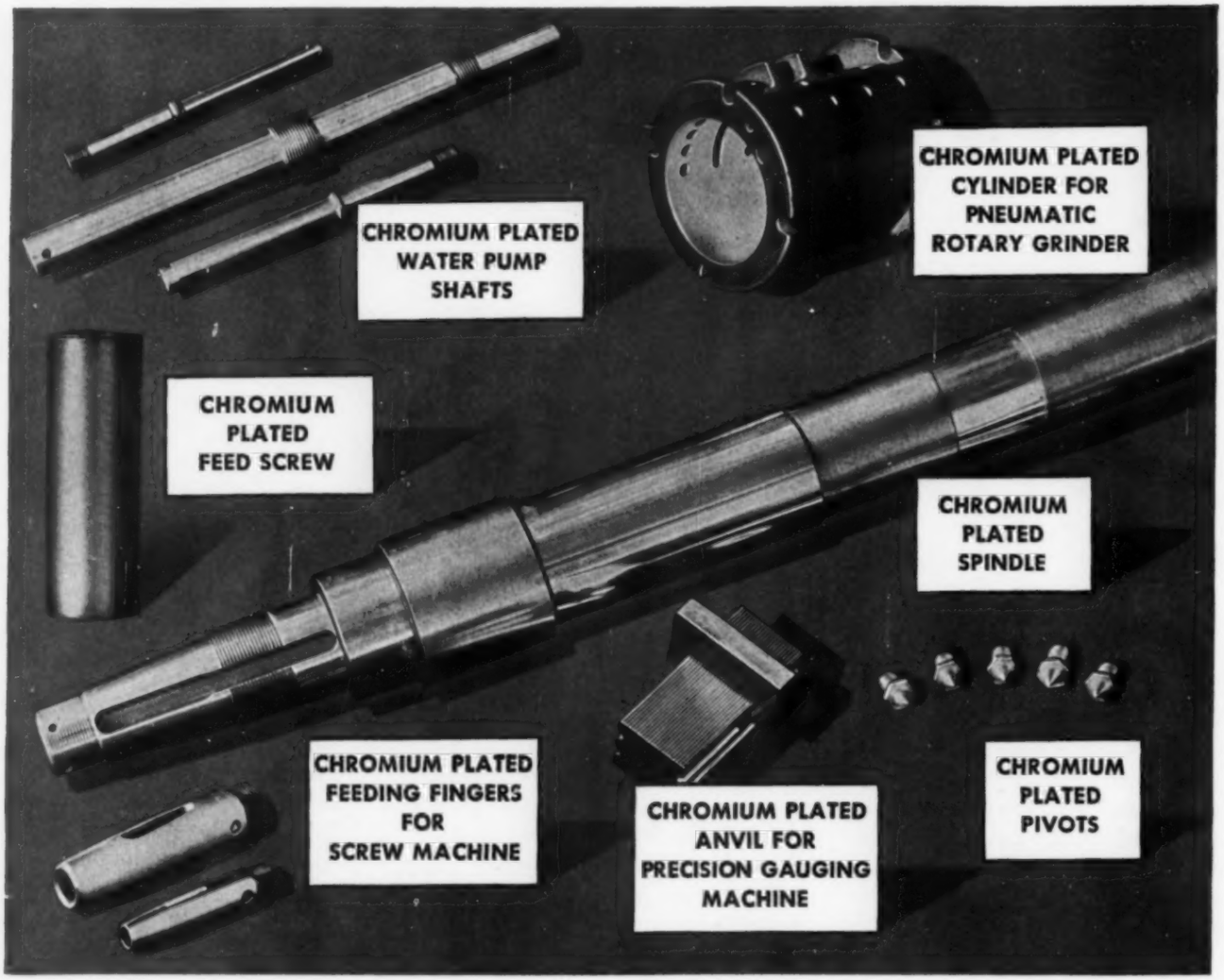
BAKELITE CORPORATION, 247 Park Avenue, New York, N.Y. . . . . 43 East Ohio Street, Chicago, Ill.
BAKELITE CORPORATION OF CANADA, LIMITED, 163 Dufferin Street, Toronto, Ontario, Canada

BAKELITE

"The registered trade marks shown above distinguish materials manufactured by Bakelite Corporation. Under the capital "B" is the [B] automatic sign for infinity, or unlimited quantity. It symbolizes the infinite number of present and future uses of Bakelite Corporation's products"

THE MATERIAL OF A THOUSAND USES

MACHINERY BUILDERS FOIL WEAR AND CORROSION *by Chromium Plating*


CHROMIUM PLATED WATER PUMP SHAFTS
CHROMIUM PLATED CYLINDER FOR PNEUMATIC ROTARY GRINDER
CHROMIUM PLATED FEED SCREW
CHROMIUM PLATED SPINDLE
CHROMIUM PLATED FEEDING FINGERS FOR SCREW MACHINE
CHROMIUM PLATED ANVIL FOR PRECISION GAUGING MACHINE
CHROMIUM PLATED PIVOTS

A GREAT VARIETY of machine tool and other machinery parts, only a few of which are shown here, are now being regularly chromium plated.

Greatly reduced wear from friction and abrasion, elimination of corrosion, maintenance of accuracy, and improved appearance are among the advantages of chromium plating reported by users.

Let us send you further facts about this proved means of improving the saleability and dependability of machine tools and other machinery. Also let us furnish information about the chromium plating process and engineering service made available under our licensing arrangement.

★

United Chromium
INCORPORATED

Executive Offices:
51 East 42nd Street
New York City

DETROIT
SAN FRANCISCO
WATERBURY

The MACHINE TOOL SHOW

will convince you that much of the rapidly increasing popularity of

HYDRAULIC FEEDS AND CONTROLS

is due to the VICKERS equipment now available

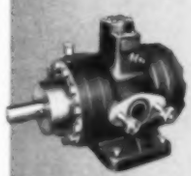
VICKERS Hydraulic (Oil) Circuits offer the builder and user of machine tools these advantages: (1) feed rates can always be varied by simply moving a lever and without time and expense for changes in cams, gears, etc., (2) feed rate is uniform regardless of variations in work resistance and hydraulic (oil) pressure, (3) flexibility in location of units which permits greater convenience and improved appearance, (4) simplicity and economy resulting from use of standard Vickers pumps, valves and other units, (5) "cushioning" effect of oil avoids shock to work and machine, reducing tool breakage and maintenance costs, (6) better finishes are secured, (7) production is higher, (8) machine is protected against damage by overloading.

Practically any required feeds and sequence of motions can now be obtained by various arrangements of standard Vickers pumps, valves, etc. See us in Booth E-412 or write for data regarding applications that interest you.

VICKERS INCORPORATED, 1400 Oakman Blvd., Detroit, Mich.

Vickers Vane-Type Rotary Pump

Vickers Combination Pump and Valve Unit


Vickers V-Type 2-Stage Rotary Pump

Vickers Feed Control Valve

Vickers Control Panel

Vickers Fluid Motor and Gear Pump

Vickers Hydraulic Relief Valve

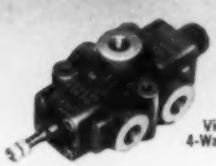
Vickers Pilot Valve

Vickers Motor-Pump

Vickers Control Panel

Vickers Oil Reservoir and Motor Base

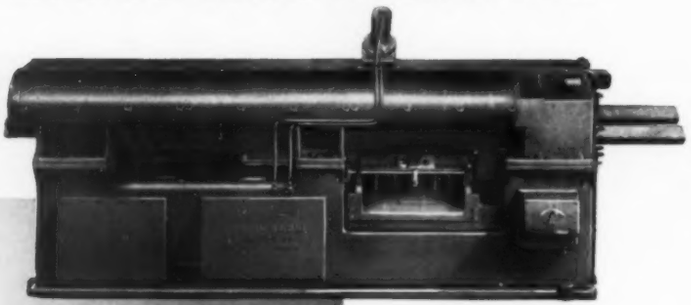
Vickers Hydraulic Variable Speed Transmission


Vickers 4-Way Valve

SEE THESE EXHIBITS AT

BOOTH 1005

AMERICAN BROACH & MACHINE CO.



American Special Tunnel Type Broaching Machine. The hydraulic operating circuit, which includes automatic loading, contains Vickers combination and tandem vane-type rotary pumps, feed control, and all necessary control valves.

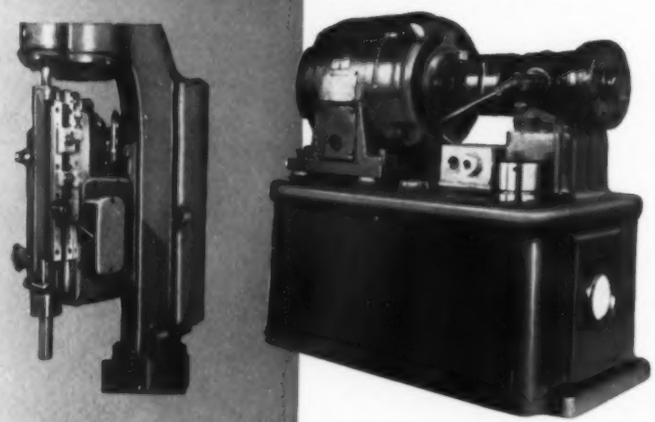
BOOTH 108

ARTER GRINDING MACHINE CO.

Arter Model C Hydraulically Operated Motor-in-Head Rotary Surface Grinder. In addition to Vickers vane-type rotary pumps, this machine uses a Vickers speed control valve and a Vickers fluid motor.

BOOTH 18

THE AVEY DRILLING MACHINE CO.

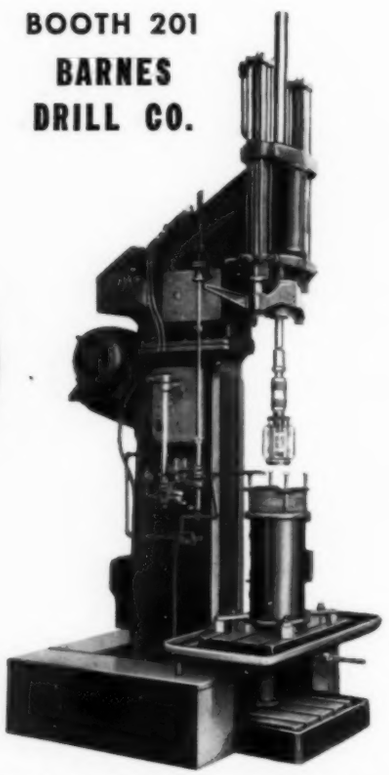


Avey Hydraulic Power Unit incorporates a Vickers vane-type rotary pump and relief valve. "Avey-draulic" head is a general purpose hydraulic feed.

ALSO SEE THE VICKERS EXHIBIT BOOTH E-412

BOOTH 201

BARNES DRILL CO.



Barnes No. 2420 Hydraulically Reciprocated Honing Machine has complete Vickers pump and valve mechanism, as has the No. 194 machine. The No. 5 Horizontal Honing Machine uses Vickers fluid motor. H-1 Hydram (Hydraulic Feed) Drilling Machine also has Vickers equipment.

BOOTH 203

BRYANT CHUCKING GRINDER CO.

Bryant No. 16 Grinder has a full hydraulic circuit that includes Vickers vane type rotary pump, relief valve, and miscellaneous hydraulic equipment.

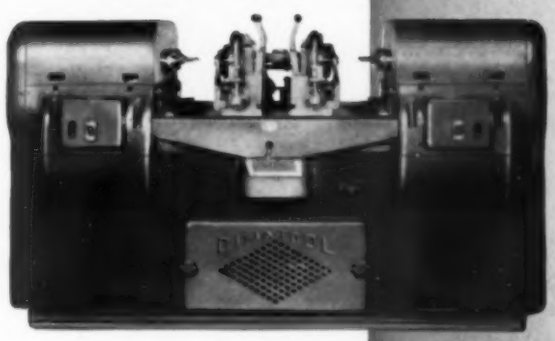
THEY INDICATE THE GROWING PREFERENCE

THE MACHINE TOOL SHOW

BOOTH E-506
EDWIN E. BARTLETT CO.

No. 60 Greenerd Arbor Press is hydraulically operated and is equipped with a Vickers standard unit consisting of a combination vane-type rotary pump and bypass, relief and check valves.

BOOTH 108-B
THE CIMATOOL COMPANY



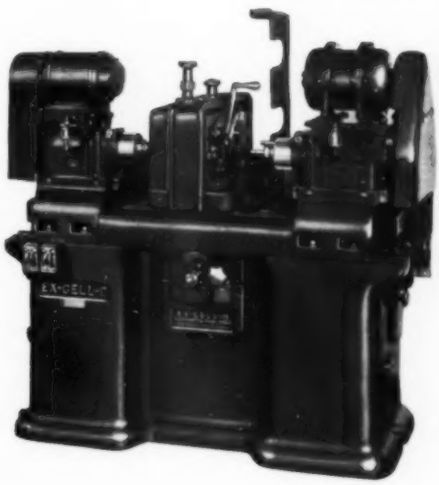
Cimatool Boring Machine, Heavy Duty Model, provides the many advantages of hydraulic operation. The hydraulic circuit on this machine includes Vickers vane-type rotary pump, control panel and valves.

BOOTH 207
THE CINCINNATI MILLING MACHINE CO.

CINCINNATI GRINDERS INCORPORATED

Cincinnati 2-36 Duplex Vertical Hydro-Broach and the other five sizes in this line are completely hydraulic; all are equipped with Vickers vane-type rotary pumps and relief valves.

BOOTH 812
EX-CELL-O AIRCRAFT & TOOL CORPORATION



Ex-Cell-O Junior Double-End Precision Boring Machine has a Vickers vane-type rotary pump. The Junior Single-End, Senior Double-End and Senior Single-End also use Vickers pumps.

BOOTH 912
THE FOOTE-BURT COMPANY

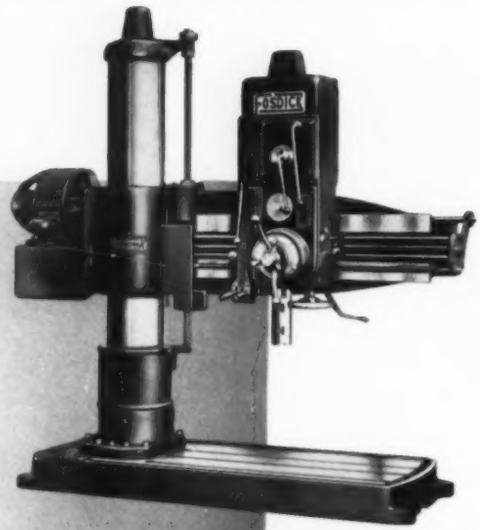
"Footburt" Vertical Single Slide Hydraulic Surface Broaching Machine uses Vickers vane-type rotary pump and valving for obtaining automatic cycle. The 10-inch Hydraulic Feed Drilling Machine Unit also shown has Vickers pump, relief valve and control panel.

FOR VICKERS HYDRAULIC EQUIPMENT

BE SURE TO SEE THESE

BOOTH 1004

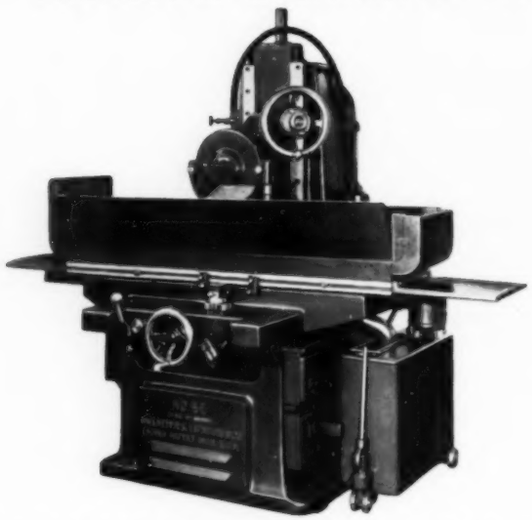
THE FOSDICK MACHINE TOOL CO.



Fosdick Radial Drill has hydraulic power for the control and traverse of the head and arm. Vickers equipment is used for the entire hydraulic circuit.

BOOTH 307

GALLMEYER & LIVINGSTON CO.



No. 55 Grand Rapids Hydraulic Feed Surface Grinder is equipped with a Vickers vane-type rotary pump and relief valve which provide power for table reciprocation.

GOGAN MACHINE CORPORATION

BOOTH A-211

ALSO SEE THE VICKERS EXHIBIT BOOTH E-412

Model 911 Gogan Magnetic Floor Type Hardness Testing Machine. Hydraulic pressure is supplied by a Vickers vane-type rotary pump.

BOOTH 104

HANNIFIN MANUFACTURING CO.

Hannifin "Hi-Power" Portable Hydraulic Riveter. The hydraulic pressure generator is a compact and completely automatic power unit using Vickers vane-type rotary pump.

THEY HAVE MANY INTERESTING APPLICATIONS

MACHINES AT THE SHOW

BOOTH 6

HUTTO MACHINE DIVISION

THE CARBORUNDUM COMPANY

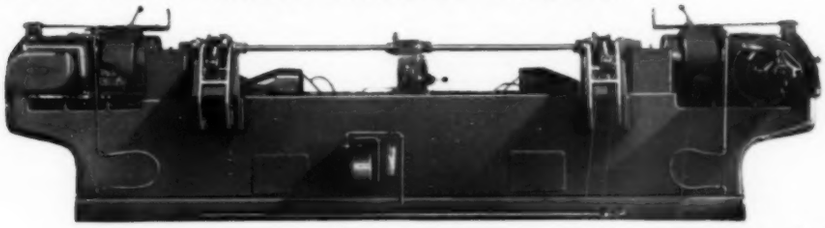
Hutto Vertical Hydro-Mechanical Honing Machine in which Vickers vane-type rotary pump and valves provide the power and control for the mechanism.

BOOTH 1001

THE R. K. LE BLOND MACHINE TOOL CO.

Exhibit will include a Le Blond Tool Room Lathe equipped with a Vickers Hydraulic Variable Speed Transmission for driving spindle. Transmission provides stepless speed variation in both directions and hydraulic braking of spindle.

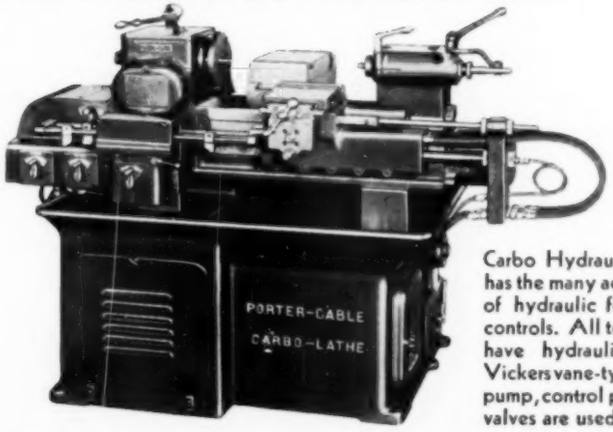
BOOTH 204 **LANDIS MACHINE COMPANY**



"Lanhydro" Threading Machine using Vickers hydraulic equipment for controlling movement of headstock, opening and closing jaws that grip work and also controlling movement of work-locating stop.

BOOTH 307-C

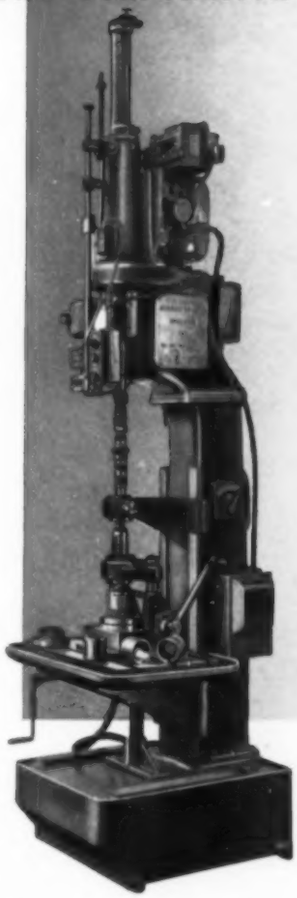
THE PORTER-CABLE MACHINE CO.



Carbo Hydraulic Lathe has the many advantages of hydraulic feeds and controls. All tool slides have hydraulic feeds; Vickers vane-type rotary pump, control panel and valves are used.

BOOTH E-205

MICROMATIC HONE CORPORATION



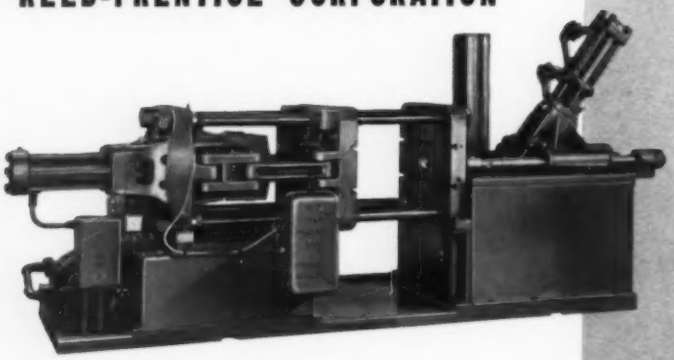
Micromatic Honing Tools will be demonstrated on a Barnes No. 194 Hydraulically Reciprocated Honing Machine provided with a complete Vickers pump and valve mechanism.

OF VICKERS HYDRAULIC FEEDS AND CONTROLS

MORE INTERESTING MACHINES AT THE SHOW

BOOTH C

REED-PRENTICE CORPORATION



No. 2 Reed-Prentice Full Hydraulic Die Casting Machine is provided with the following Vickers equipment: combination vane-type pump and valve unit, check valves, 4-way valves, interlock timing valve and pilot valve.

BOOTH 310

ROCKFORD MACHINE TOOL CO.

The Rockford Hy-Draulic Shaper uses hydraulic power for ram-drive, feeds and rapid traverses. The hydraulic circuit includes Vickers vane-type rotary pump, fluid motor, and control, relief, 4-way and back pressure valves.

BOOTH 24

THE THOMPSON GRINDER CO.

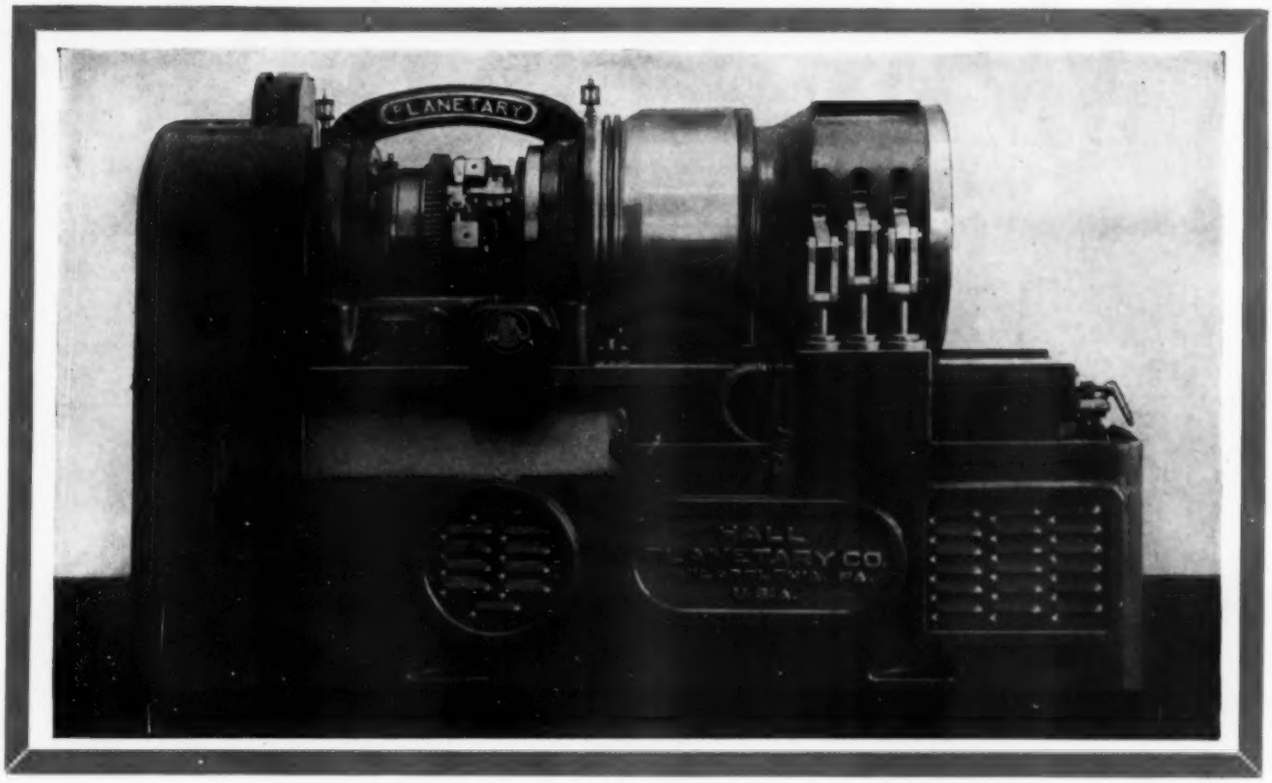
Thompson Grinding Machine using Vickers vane-type rotary pump to supply hydraulic power required for table reciprocation.

ALSO SEE THE VICKERS EXHIBIT BOOTH E-412

OTHER EXHIBITORS who use VICKERS HYDRAULIC EQUIPMENT for machines that are not on display:

BAKER BROTHERS, INC.
THE CINCINNATI BICKFORD TOOL CO.
THE ELWELL-PARKER ELECTRIC CO.
GREENLEE BROS. & CO.
THE HALL PLANETARY COMPANY
THE INGERSOLL MILLING MACHINE CO.
KEARNEY & TRECKER CORPORATION
THE LAPOINTE MACHINE TOOL COMPANY
THE SPRINGFIELD MACHINE TOOL CO.
SUNDSTRAND MACHINE TOOL CO.
TOLEDO SCALE COMPANY

...USING VICKERS HYDRAULIC EQUIPMENT



A NEW MACHINE *by* HALL PLANETARY

It mills pipe threads FASTER, MORE ACCURATELY *and at* LOWER COST *than pipe threads have ever before been cut*

See the complete line of newly designed HALL PLANETARY MACHINES for Planamilling and Planathreading at THE MACHINE TOOL SHOW in CLEVELAND Sept. 11 to 21 at Booth No. 14.

The machine pictured above was built for one of the big steel mills—to mill threads on pipe from 2″ to 18″ dia. It is guaranteed to produce a thread accurate to within .0005″ as to lead over its whole length of 3⅜″—a smooth, clean-cut thread free from chatter marks or waves, and a true round regardless of irregularities in pipe form.

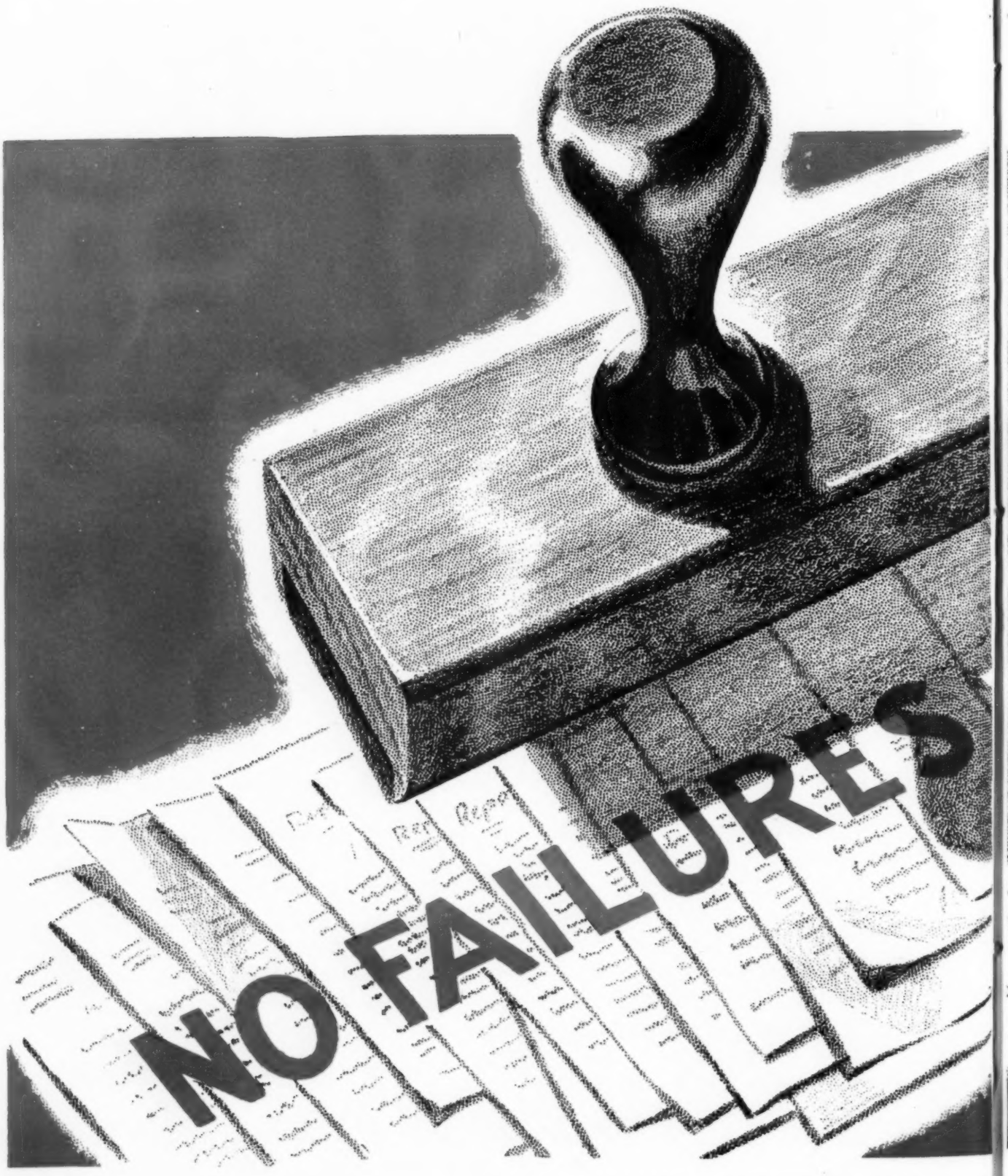
We'd like to tell you about this machine—*and what it can do to your threading costs,* especially on large diameter pipe. Its accuracy and its speed are amazing to anyone not familiar with Planathreading methods. If you thread large pipe, in quantities, by all means get complete information on this new machine.

Write us and we'll have our representative in your neighborhood call.

THE HALL PLANETARY CO.

Fox St. and Abbotsford Rd., PHILADELPHIA, PA.

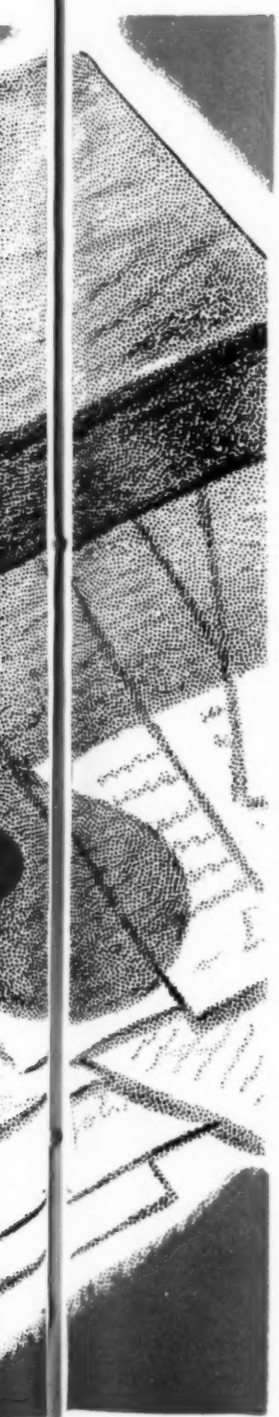
"We've Had No...



BEARING FAILURES

since standardizing on

TYCOL"



"Since standardizing on Tycol Green Cast Greases we have not had a single bearing failure chargeable to improper lubrication," said the superintendent of one of the largest independent bituminous coal operators in the country. "We formerly tried using several different brands of grease. Our periodic inspection reports used to show occasional bearing failures due to a poor greasing job, but not any more. Not a bearing has failed with Tycol Grease."

Substantial savings with Tycol Green Cast Greases in maintenance and operating costs are being reported by machinery users in every field. Savings run from 15% to 50%, depending on the application.

The secret of this trouble-free and money-saving grease is the method of composition with 100% paraffine base cylinder oil. This grease is made in the proper consistency for both indoor and outdoor service. Identify this grease by its natural green cast.

Tide Water sales engineers will help you select the exact consistency for your application. Their recommendation may effect substantial savings for you.

TIDE WATER OIL COMPANY
17 Battery Place, New York, N. Y.

Check Your Greases For These 4 Qualities
. . . they are essential to proper lubrication!

1. Uniformity of the grease and the absence of non-lubricating fillers.
2. Consistency of the grease to suit method of application.
3. Quality of the lubricating oil and other ingredients.
4. Adaptability of the grease to suit operating conditions.

Tycol Greases are founded on these 4 qualities

TIDE WATER
Green Cast Greases

THERE IS A COMPLETE LINE OF TYCOL LUBRICANTS SCIENTIFICALLY ENGINEERED FOR EVERY INDUSTRIAL USE

The Flying Yankee, Crack Train of the Boston and Maine and Maine Central Railroad, is Lubricated with

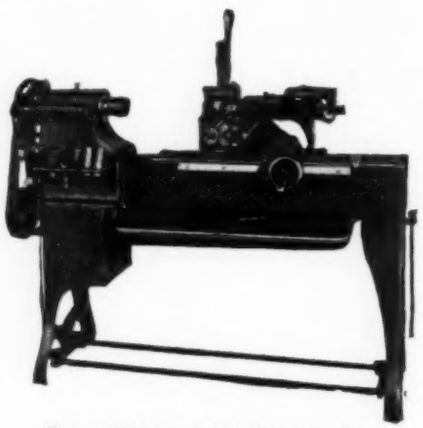
VEEDOL

a Product of the Tide Water Oil Company

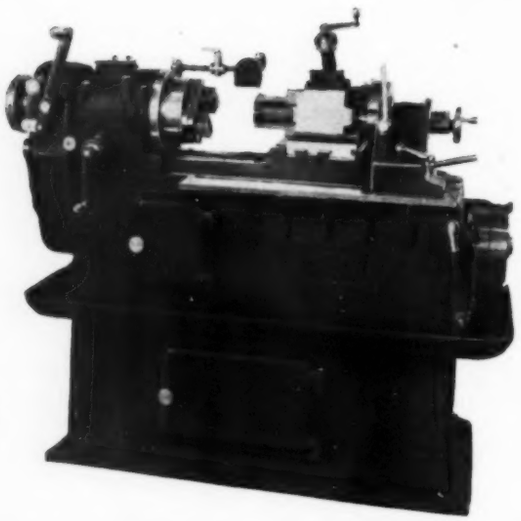
VISIT BOOTH 404

PRESENTING MACHINES and TOOLS that make laboratory precision available in production

Hanson-Whitney Universal Vertical Tool and Die Shaper—a fast precision machine for dies and tools which will effect savings on many jobs.



Hanson-Whitney Rapid Precision Centering Machine—a time and labor saver which rotates the work and supports it in a 3-point center rest.



Hanson-Whitney Universal Semi-Automatic Thread Milling Machine—assuring fast, precision work on either external or internal thread milling, right or left hand threads.

The Hanson-Whitney Machine Company

Hartford, Conn., U.S.A.

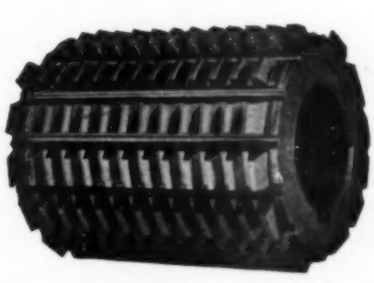
The HANSON-WHITNEY LINE of Die Shapers, Centering Machines, Automatic Threading Machines, Super-Accurate Taps, Thread Gages and Thread Hobs which will be shown at the Machine Tool Exhibit are products of wide acceptance in modern shops because of their recognized accuracy and long life. They have been an outstanding contribution to interchangeable manufacturing because they make it economically practical to achieve laboratory standards of precision in the tool room and on the production line.

Thread Gages in the Hanson-Whitney line are "Finished after Hardening" by the Hanson Process.

One of the long line of "Hanson Process" Taps.

Taper Pipe Taps of high speed steel, "Finished after Hardening" are available in sizes from ¼ in. to 2 in.

"Hanson Process" Thread Hob.



Hanson-Whitney Hobs are "Finished after Hardening" by the Hanson Process.

Every dimension of "Hanson Process" Taps is under complete control.

DOMESTIC REPRESENTATIVES

MACHINERY AND SMALL TOOLS—Cincinnati, Ohio, Seifreat-Elstad Mchy. Co.; Dayton, Ohio, Seifreat-Elstad Mchy. Co.; Detroit, Mich., A. G. Brice—H. B. Morrison; New York, N. Y., L. C. Biglow & Company, Inc.; Pittsburgh, Pa., William K. Stamets; San Francisco, Calif., A. H. Coates & Company; Syracuse, N. Y., George McPherson; Toronto and Montreal, Canada, Arthur Jackson Mche. Tool Co.

MACHINERY ONLY—Chicago, Ill., Marshall & Huschart Mchy Co.; Cleveland, Ohio, William K. Stamets; Philadelphia Pa., Lloyd & Arms, Inc.

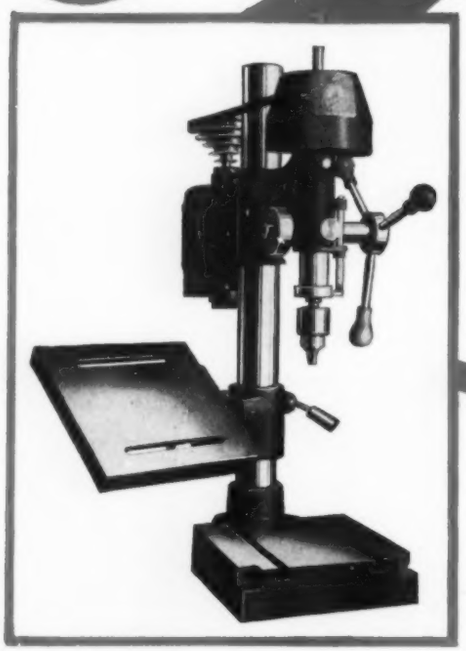
SMALL TOOLS ONLY—Chicago, Ill., M. Ray Pearce; Cleveland, Ohio, George A. Whalon; Milwaukee, Wisc., George M. Wolff, Inc.; Philadelphia, Pa., General Tool Sales Co.

Buffalo comes

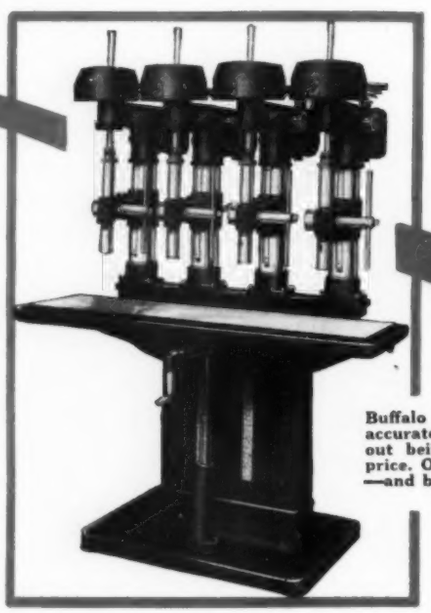
with an

EXHIBITION

you cannot afford to miss



Popular from Alaska to Africa — the new 5-speed, No. 15 Drill (bench and floor types) introduced a few months ago, and the largest selling drill in the Buffalo line. Operate it at Space 111.



Buffalo Multispindle Drills are accurate and substantial without being excessively high in price. Operate them—get prices—and be surprised! Space 111.

"Buffalo" also manufactures

fans of all types; heating, ventilating and air conditioning equipment; Driers and Coolers. We will be glad to make recommendations on your problems in any of these lines.

to Cleveland

—with the finest selection of tools we've offered in fifty-seven years in business!

—several new drills—produced to do two things—operate accurately—and economically!

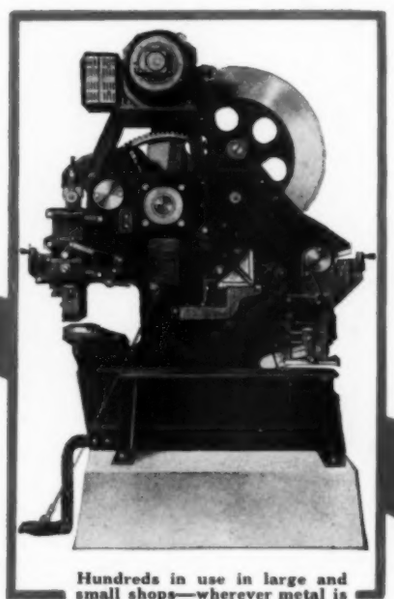
—new features on every metal cutting and bending tool.

—new, simplified operating mechanism to speed work by unskilled labor.

In short, we're showing fourteen machines that every shop man will enjoy seeing in operation.

Remember our space, 111, New North Annex.

We'll see you at Cleveland.



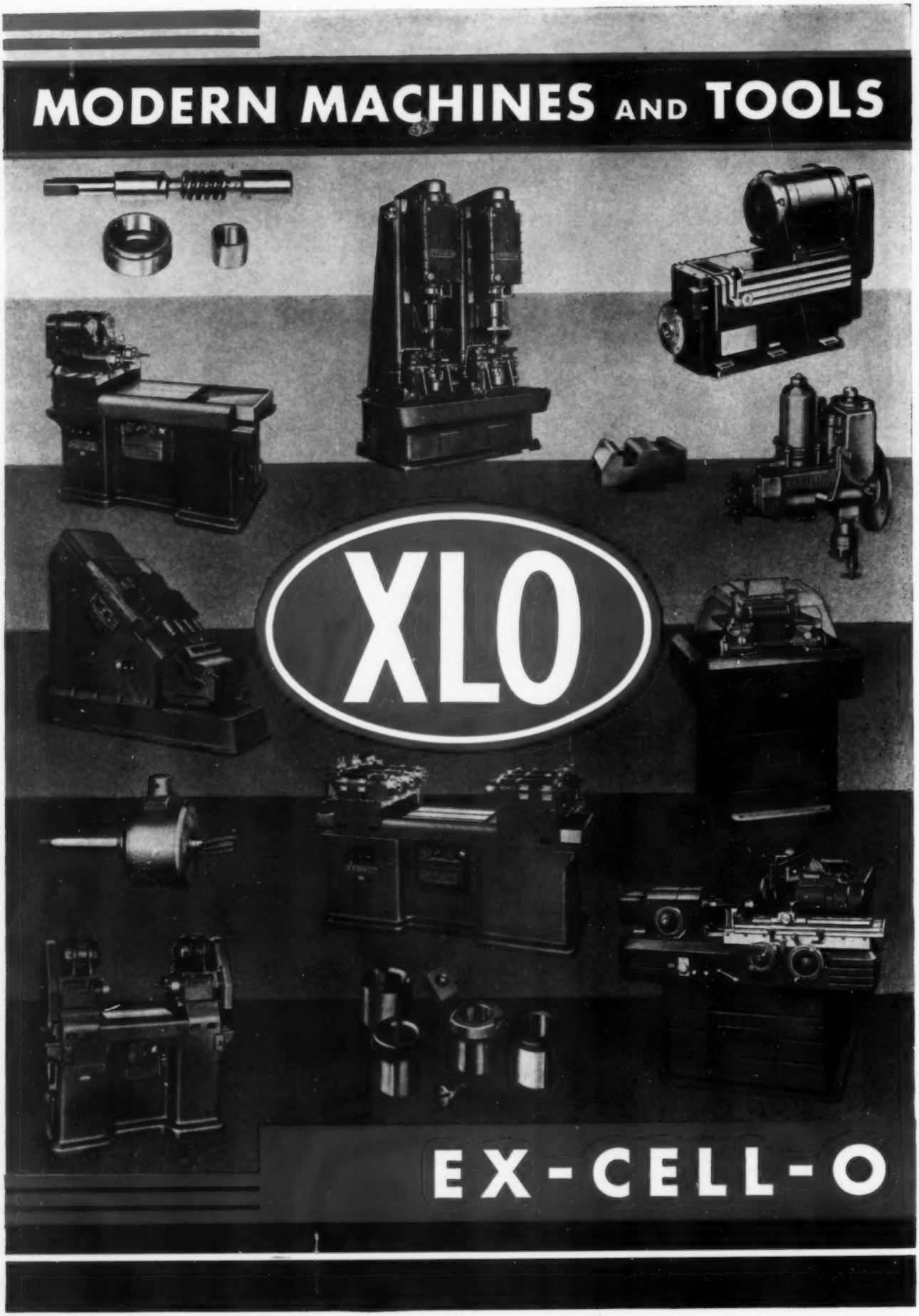
Hundreds in use in large and small shops—wherever metal is cut and punched. Buffalo Universal Iron Workers now have several "1935" features.

Bending rolls save enormously in shops where arcs or circles are frequently required. Patented design offers operating features found in no other machine. Three models demonstrated at Space 111.

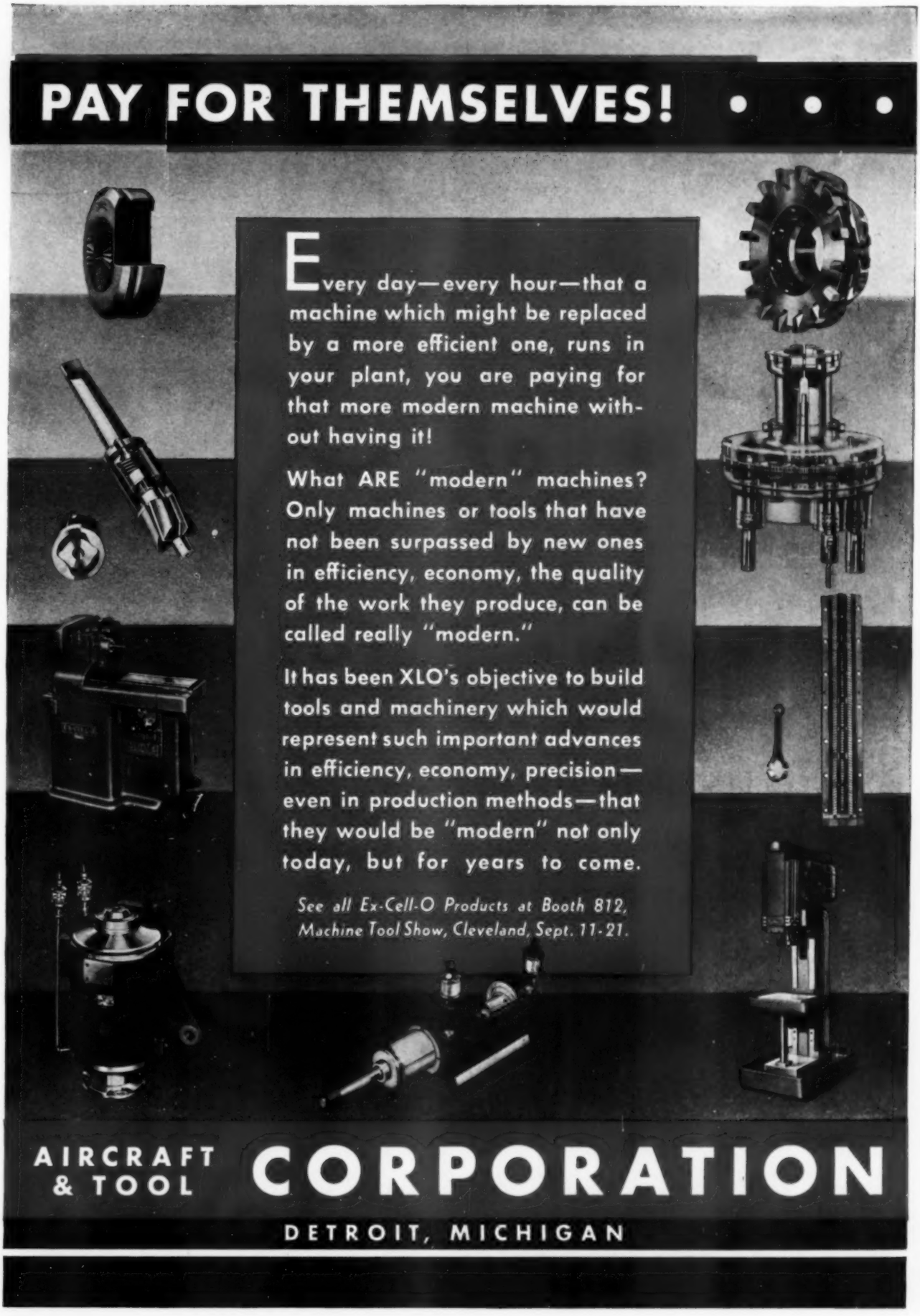
BUFFALO FORGE COMPANY

448 Broadway **Buffalo, N. Y.**

In Canada: Canadian Blower & Forge Co., Ltd., Kitchener, Ont.


MODERN MACHINES AND TOOLS
XLO
EX-CELL-O

PAY FOR THEMSELVES! • • •



Every day—every hour—that a machine which might be replaced by a more efficient one, runs in your plant, you are paying for that more modern machine without having it!

What ARE "modern" machines? Only machines or tools that have not been surpassed by new ones in efficiency, economy, the quality of the work they produce, can be called really "modern."

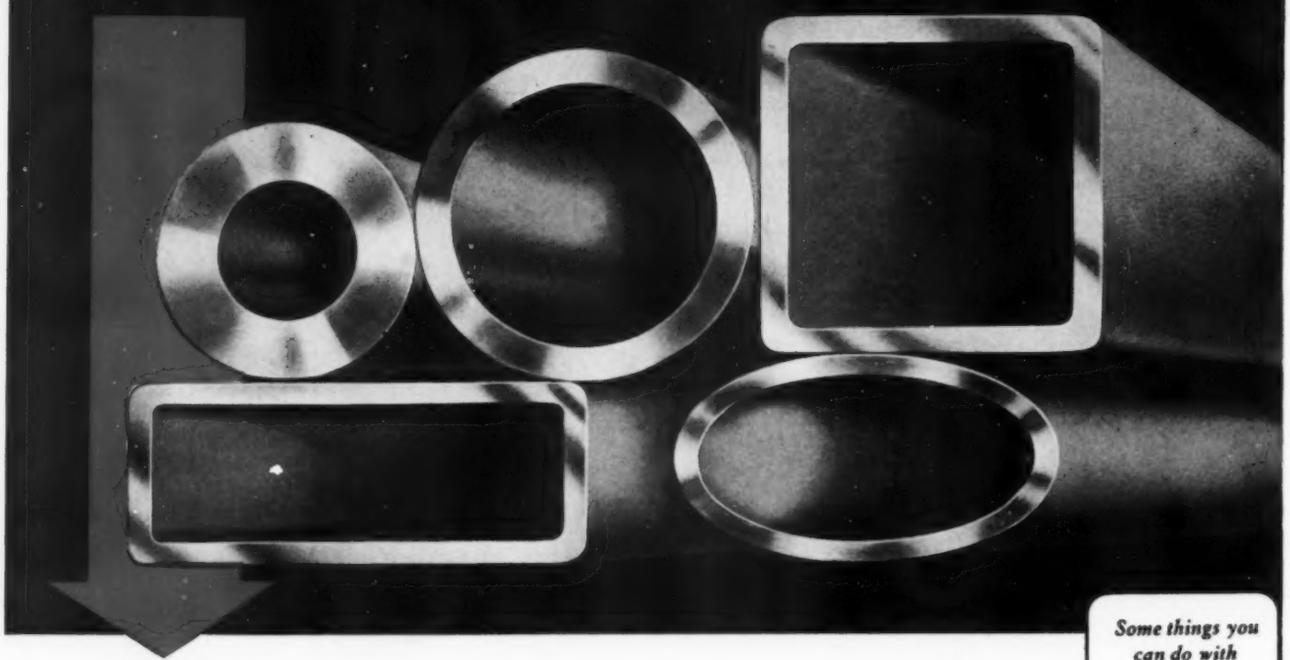
It has been XLO's objective to build tools and machinery which would represent such important advances in efficiency, economy, precision—even in production methods—that they would be "modern" not only today, but for years to come.

See all Ex-Cell-O Products at Booth 812, Machine Tool Show, Cleveland, Sept. 11-21.

AIRCRAFT & TOOL **CORPORATION**

DETROIT, MICHIGAN

3 GOOD REASONS
why seamless tubing is the better basis for Parts



1 MACHINING OPERATIONS ARE MINIMIZED

2 LABOR IS ECONOMIZED

3 WEAR ON TOOLS IS REDUCED

Use NATIONAL-SHELBY Seamless Tubing for making modern-day parts and you will be up-to-the-minute in efficient manufacturing and cost-saving. Just a single cut or light grinding may be all that is needed to make your part, or perhaps simple swaging, expanding, or upsetting, either from hot-finished or cold-drawn tubing. The finished part will be of fine, uniform steel structure with exceptional strength and no excess weight. Available in practically any size and wall-thickness and in various shapes. Grades and treatments of steel are furnished to meet almost any use. Send for Seamless Handbook.

NATIONAL TUBE COMPANY • Pittsburgh, Pa.

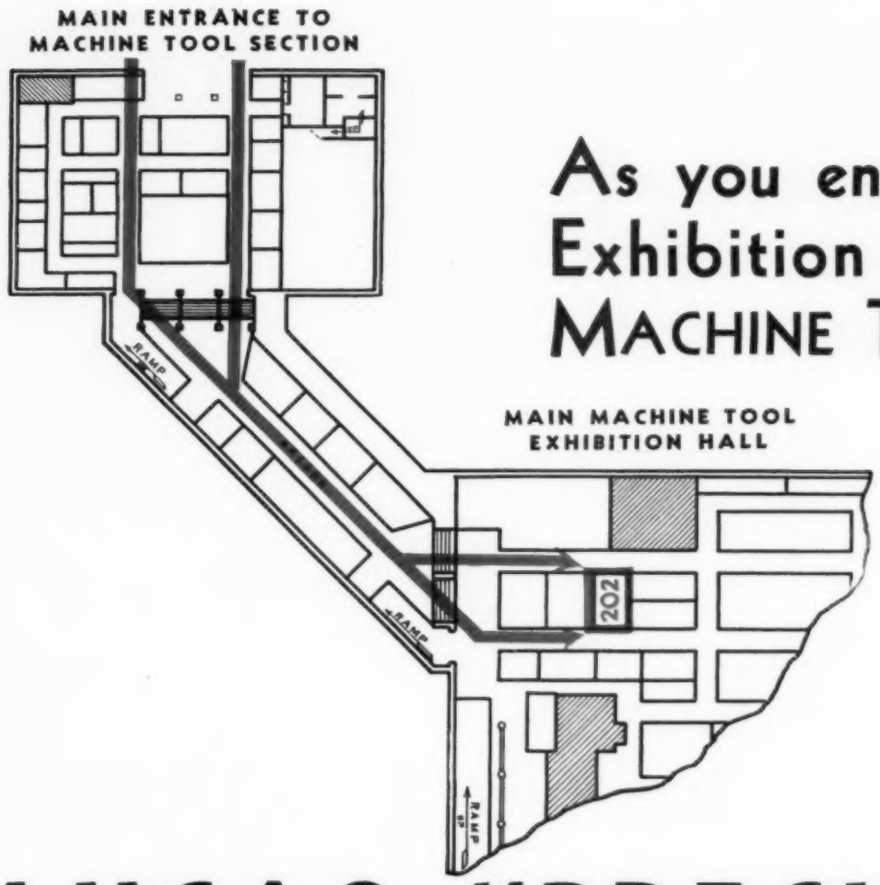
Pacific Coast Distributors—COLUMBIA STEEL CO., San Francisco, Calif.
Export Distributors—UNITED STATES STEEL PRODUCTS CO., New York, N. Y.

United States Steel Corporation Subsidiary

Some things you can do with NATIONAL-SHELBY Seamless Tubing

TWIST IT
WELD IT
THREAD IT
MACHINE IT
GRIND IT
SWAGE IT
COAT IT
BEND IT
COIL IT
UPSET IT
TEMPER IT
FLANGE IT
EXPAND IT
FLATTEN IT

NATIONAL-SHELBY
SEAMLESS MECHANICAL TUBING



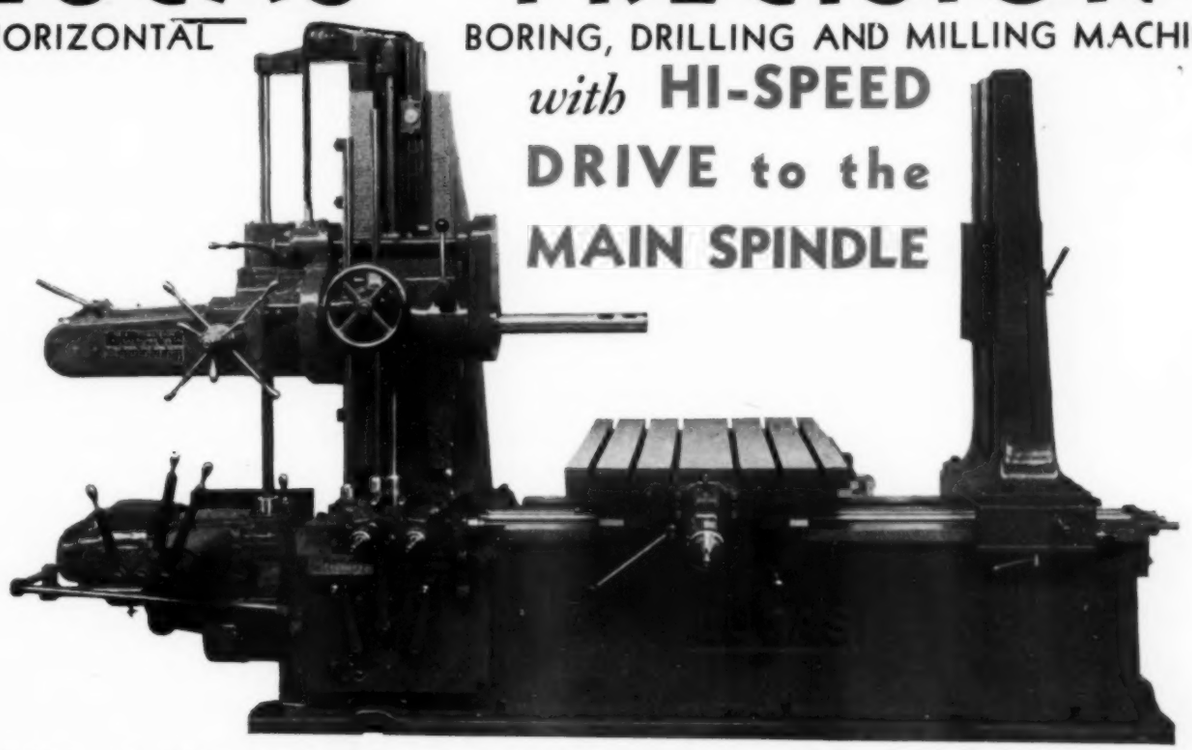
As you enter the Main Exhibition Hall of the MACHINE TOOL SHOW

STOP AT THE THIRD SPACE 202 TO SEE THE

LUCAS "PRECISION"

HORIZONTAL BORING, DRILLING AND MILLING MACHINE

with **HI-SPEED DRIVE to the MAIN SPINDLE**



THE LUCAS MACHINE TOOL COMPANY

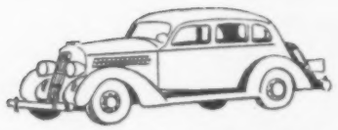
NOW AND ALWAYS OF

523 E. 99th ST., North of St. Clair Ave.

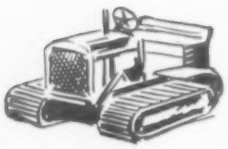
CLEVELAND ••• OHIO

AGRICULTURAL MACHINERY BUILDERS

MOTOR MANUFACTURERS



MOTOR CAR AND ACCESSORIES MANUFACTURERS



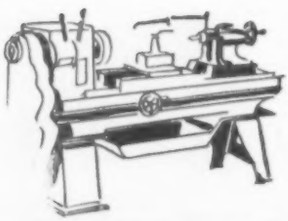
TRACTOR MANUFACTURERS

LOCOMOTIVE BUILDERS

MEN OF MANY PRODUCTS

BOTTLE MAKERS

REFRIGERATOR MANUFACTURERS



VOCATIONAL SCHOOLS

You'll meet them at the Machine Tool Exposition in Cleveland, Ohio, September 11-21, 1935. They will attend to see in operation the modern tools for industry, to keep step with industrial progress. They will find it profitable to visit the LeBlond Booth No. 1001. Whatever your business, the LeBlond exhibit will touch it at some point, and the experience of 50 years of successful machine tool building will be at your service.

THE R. K. LeBLOND MACHINE TOOL CO.
Cincinnati, U. S. A.

LE BLOND

THE LATEST BAKER *Blessed Events*

YES..THERE ARE TWO

★ The newest developments of the 58 year old Baker line are displayed at the Machine Tool Show. These offspring of advanced engineering and careful manufacture are the Baker contribution to low-cost production. Look them over at Booth 307 B. They are good! . . . Production men have found it profitable to let Baker machines lower manufacturing costs. Baker Brothers, Inc. . . . Toledo, Ohio.

DRILLING AND BORING MACHINES . . . KEYSEATERS . . . CONTOUR GRINDERS

★ BAKER ★

UNBRAKO

KNURLED

KNURLED

"UNBRAKO"
Socket Head Cap Screw

"UNBRAKO"
Hollow Set Screw

"UNBRAKO"
Socket Head Stripper Bolt

"UNBRAKO"
Square Head Set Screw

"UNBRAKO"
Hollow Pipe Plug

OUTSTANDING "UNBRAKO" FEATURES

KNURLED HEADS of Socket Cap and Stripper Bolts speed up work, as the knurled finish provides for an excellent finger gripping surface, and this saving in time represents actual and worth while lower final costs.

This Knurled feature also provides for the UNBRAKO Socket Head Cap Screws being conveniently and effectively locked, thereby eliminating the possibility of their working loose.

QUALITY, as represented by close tolerances, a carefully selected grade of nickel alloy steel, heat treated to the proper degree of hardness and toughness, is embodied in all UNBRAKO Screws to a most satisfying extent.

SAMPLES GLADLY FURNISHED UPON REQUEST

STANDARD PRESSED STEEL CO.

BRANCHES
BOSTON
CHICAGO
DETROIT

JENKINTOWN, PENNA.
BOX 4

BRANCHES
NEW YORK
SAN FRANCISCO
ST. LOUIS

NEW PORTER-CABLE CARBO-HYDRAULIC (CYCLE) Lathe

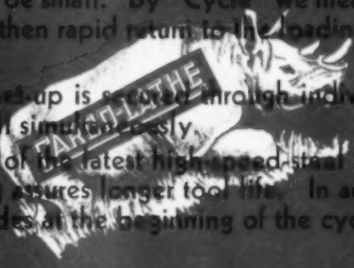
FOR LOW COST PRODUCTION OF DUPLICATE PARTS

Hydraulic Power Cross Feed, Carriage Control, Tool Relief and Facing Attachments

Be sure to see it in operation at the MACHINE TOOL SHOW BOOTH 307-C

Besides retaining all the best features of our last previous model, this new lathe is completely hydraulic.

Being a full Automatic "Cycle" Lathe one operator can run two or more machines — even though the operating time may be small. By "Cycle" we mean rapid advance of the tools to the work, slower feeding rate, then rapid return to the loading position — with positive tool relief.



Unprecedented flexibility of set-up is secured through individual control of any one tool slide independently — or of all simultaneously.

Designed for fullest utilization of the latest high-speed steel and tungsten-carbide tools, the smooth even hydraulic feeding assures longer tool life. In addition, the positively accurate automatic setting of all tool slides at the beginning of the cycle permits duplication of work within very close limits.

Be sure to see this money-saving production-boosting machine in operation if you get to the Machine Tool Show in Cleveland — and the coupon below will bring complete information by return mail. Fill it out and mail it in today.

LAPPING MACHINE TYPE D-5

THIS is our New type D-5 Tool Lapping Machine. Exhaustive tests prove that lapped tools do a much better job, and retain their cutting edges longer. This machine was designed especially for that work. It operates at four speeds, thus securing a wide range of lapping utility. Also economically laps gauges, cutting tools, drawing dies, etc. The adjustable and sliding tool carriage, which holds the tool at any angle, is optional equipment. Write for bulletin showing full details of this efficient lapping equipment.

OTHER PORTER-CABLE PRODUCTS INCLUDE—

Hi-Speed Production Lathes
Milling Machine Attachments
Sanders and Grinders
Band Saws
Floor Sanders
Electric Hand Saws

PORTER-CABLE MACHINE COMPANY

SYRACUSE, N. Y.

Porter-Cable Machine Co., Syracuse, N. Y.

Gentlemen: Please send me complete information regarding your New Carbo-Hydraulic Lathe.

NAME.....

POSITION.....

COMPANY.....

ADDRESS.....

NEW 7-inch Super-Service SANDER

...for High Cycle Performance ...on Low Cycle Current

HERE'S the newest member of a great line of sanders—the huskiest of them all. It's built for Stamina with a capital S—designed to deliver High Cycle performance without High Cycle installation costs. Equipped with Universal motor, which operates on standard currents. Industry demanded more power and capacity—so here it is.

For heavy duty sanding and metal finishing on a high-speed production basis. Can meet the toughest production demands. Unusually powerful motor—extra-sturdy gear construction—long-life gear case—perfected ventilation—dust-sealed commutator and switch. Weighs only 15¼ lbs. Standard voltage 110—also 220 or 250. Complete, $85.

ALSO THREE OTHER MODELS: 9-inch Standard, for shops desiring a larger working area and lower speed on intermittent applications. • 7-inch Heavy Duty, a lighter tool, with ample power for continuous production service. • 7-inch Light Duty, for intermittent sanding, metal finishing and touching up, particularly in maintenance work. All fully described in new catalog.

SEE THE NEW SANDER and other new Black & Decker electric tools at Booth E-101, National Machine Tool Show, Cleveland. Or write for complete new catalog. The Black & Decker Mfg. Co., Towson, Md.

DRILLS
DRILL STANDS
HAMMERS AND SAWS
FLEX DISC SANDERS
HEAT GUNS

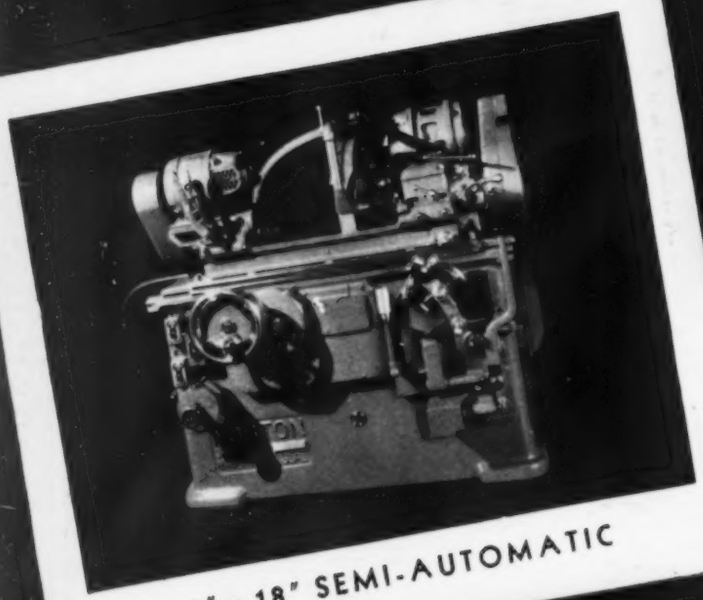
BLACK & DECKER

BENCH GRINDERS
PORTABLE GRINDERS
SCREW DRIVERS
NUT RUNNERS
TAPPERS

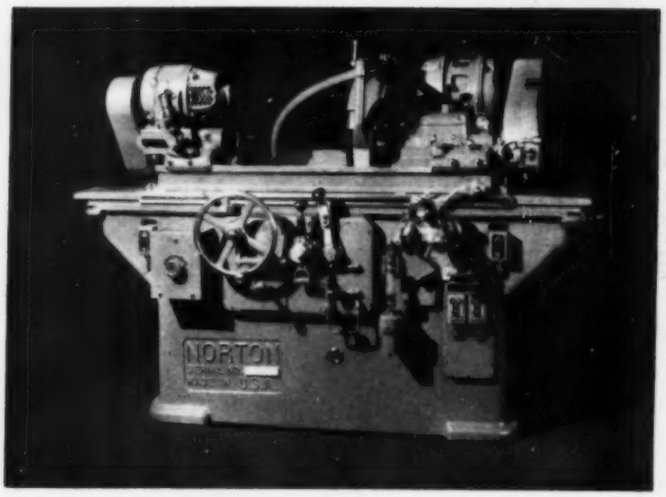
AT CLEVELAND

10 NORTON MACHINES IN ACTION

MACHINE TOOL SHOW SEPT. 11-21. 1935

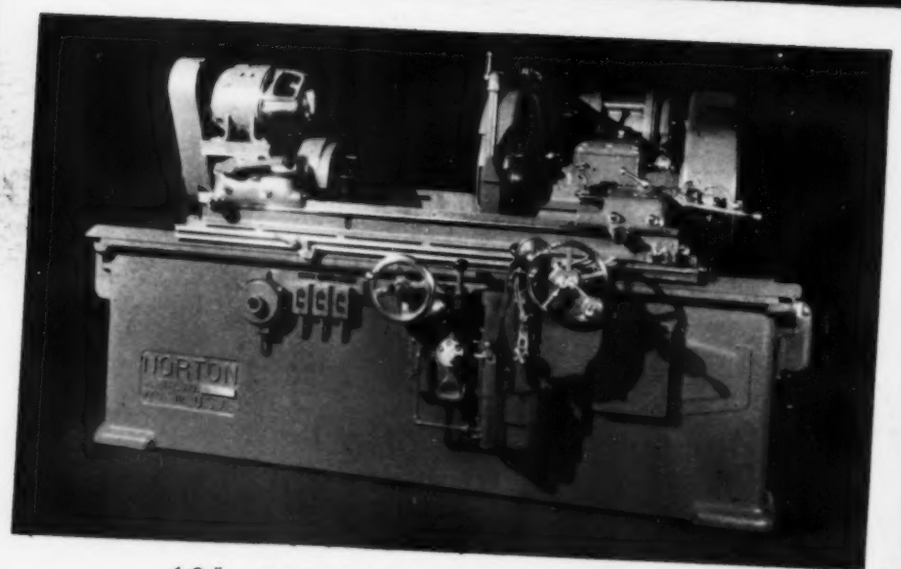


6" x 18" SEMI-AUTOMATIC



6" x 30" HYDRAULIC TRAVERSE

Two 6 inch and one 10 inch . . . All with spindles end-driven by multiple vee belts from motors mounted on wheel-slides . . . All with forced-feed lubricated ways and flood lubricated spindle bearings . . . All with the flexible design feature which permits converting them from traverse to semi-automatic models and vice-versa at any time if desired . . . All with 12-inch hole wheels, a feature which permits transferring them from 10 inch to 6 inch machines when they wear smaller.



10" x 36" HYDRAULIC TRAVERSE

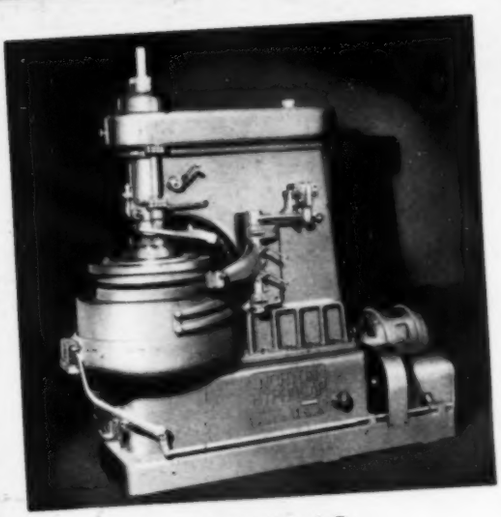
CAM-O-MATIC

The Cam-O-Matic for automatically and successively grinding the cam contours of camshafts . . . Electrically controlled, hydraulically operated . . . Forced-feed lubricated ways and flood lubricated spindle . . . The wheel leaves the cam at its nose.

●

The D-86 for grinding the pins of crankshafts . . . With a steadyrest—the LO-REST—which is hydraulically operated and drops down automatically to facilitate loading as the wheel-slide recedes . . . With interlocked controls and work-heads which stop automatically in the loading position.

D-86 CRANKPIN GRINDER



HYPROLAP

A hydraulically operated, production lapper using bonded abrasive laps . . . For flat or cylindrical work . . . With counterweighted upper lap spindle and a pressure gauge which shows exactly the pressure being applied to the work during lapping.

10-U LAPPER

A universal machine for both cylindrical and flat lapping . . . Which uses cast iron laps charged with abrasive flour and a suitable vehicle . . . With pendulum mounted motor which maintains vee belt tension . . . With one operating lever which stops the motor and applies a brake to the work and lap driving mechanism simultaneously.

GRINDING LAPPING MACHINES

No. 1 TOOL and CUTTER

No. 2 TOOL and CUTTER
(Hydraulic)

The No. 1 with 10" swing and the No. 2 hydraulic with 12" swing . . . Both have cartridge type, vee belt driven wheel spindles . . . Both have a universal work head which takes standardized 3½" per foot and No. 12, No. 10, No. 9 and No. 7 B & S tapers . . . Both with a wide variety of optional equipment for accommodating the many diversified jobs in the modern tool room.

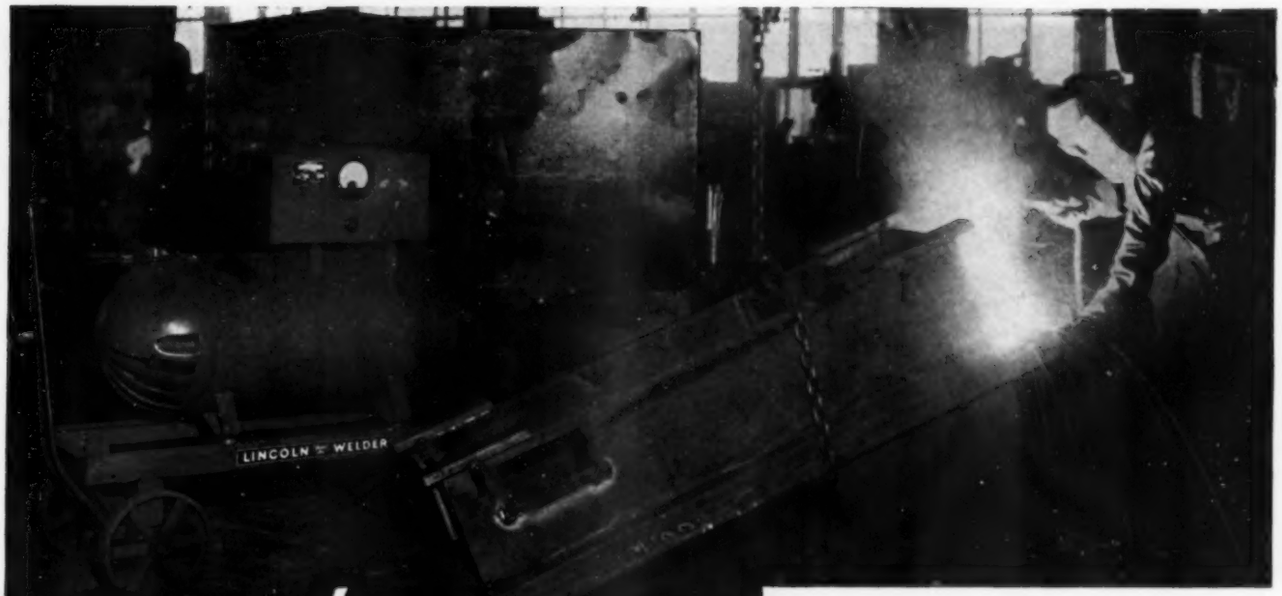
6" x 18" HYDRAULIC

●

With hydraulic or hand traverse and crossfeed . . . With cartridge type, plain bronze or ball bearing horizontal spindle; or with integral motor ball bearing horizontal or vertical spindle if you wish . . . For wet or dry grinding . . . A handy machine for the tool room or the production line . . . One of the operations being shown at Cleveland is the grinding of cemented tungsten-carbide using Norton Diamond Wheels.

NORTON
GRINDING & LAPPING
MACHINES

NORTON



"Shield-Arc" *welding a machine frame. Photo courtesy of Whitehead & Kales Co., Detroit, Mich.*

Someday the MACHINERY YOU BUILD WILL BE BETTERED! —WILL YOU • *or Someone Else* • DO IT?

PERHAPS it hasn't happened to you yet, but it's happening every day... Some other machinery builder offers his customer machine structures which are stronger and much more durable—structures which are better because they are built of steel by the *"Shield-Arc."*

Is it worth the risk of losing orders by clinging to old-time machinery-building methods? Particularly when better machinery structures are being built by *"Shield-Arc"* in a third the time and for a small percentage of the cost of other methods?

Why not find out how much better, how much quicker and how much cheaper you can build machinery with a *"Shield-Arc"* welder? Ask THE LINCOLN ELECTRIC COMPANY, Dept. A-160, CLEVELAND, OHIO. Largest Manufacturers of Arc Welding Equipment in the World. Mail the Coupon for Full Particulars.

MACHINE TOOL SHOW VISITORS
See the *"Shield-Arc"* in Action—Also Cutting Tools Made by Arc Welding. **Booth E-310.**
MACHINE TOOL EXPOSITION
Cleveland, Ohio **Sept. 11 to 21 incl.**

LAD: "Why be down in the mouth about things—it's a simple matter to have your face lifted."

POP: "But the trouble is to keep it that way when you read the news out of Washington. I wish they would give us permanence to any face lift—the way *'Shield-Arc'* gives it to machinery-building profits."

THE LINCOLN ELECTRIC COMPANY
Dept. A-160, Cleveland, Ohio

Gentlemen: How does the *"Shield-Arc"* give me all the savings arc welding offers in machinery building?

Firm .....

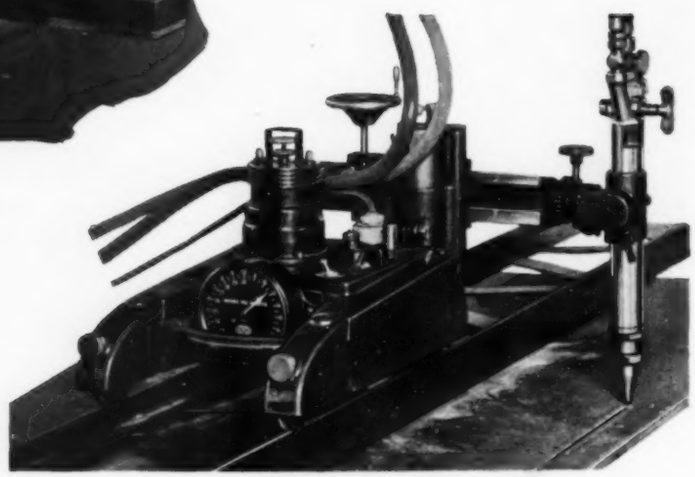
Your Name ..... Title .....

Address .....

City ..... State .....

See these OXYACETYLENE Cutting Machines *in* ACTION!

No. 6 OXYGRAPH



RADIAGRAPH

at

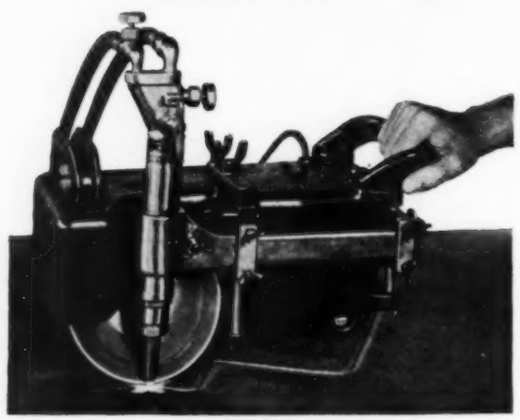
THE MACHINE TOOL SHOW

Public Auditorium

SPACES A412-414

CLEVELAND, OHIO SEPTEMBER 10-21

. . . and learn the advantages of flame cutting in the production of an unlimited variety of shapes from steel plate, slabs, billets and forgings.



TRACTOGRAPH

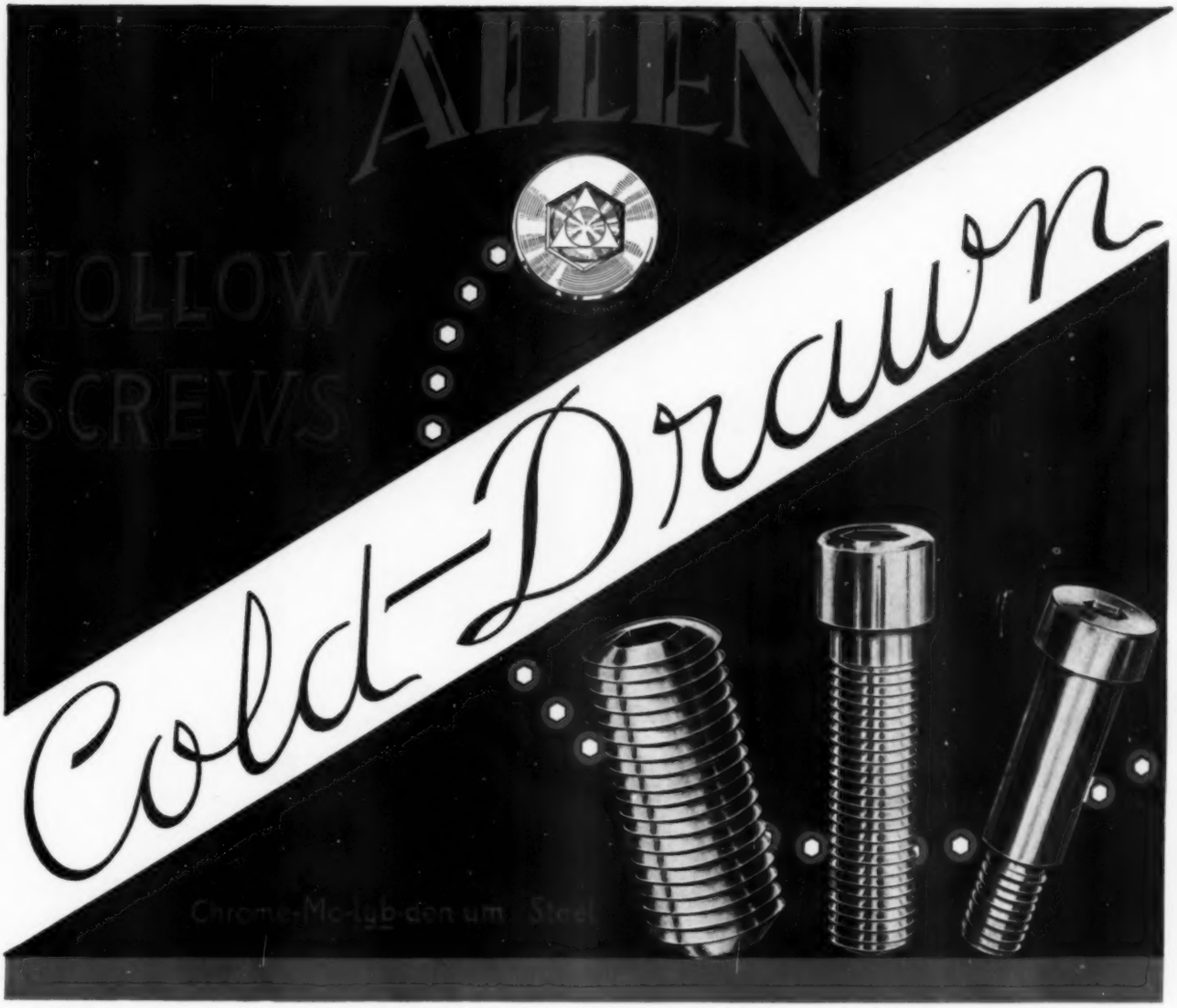
AIR REDUCTION SALES COMPANY

General Offices: 60 E. 42nd St., New York, N. Y.

DISTRICT OFFICES AND DISTRIBUTING STATIONS IN PRINCIPAL CITIES

Distributed in Texas by Magnolia Airco Gas Products Co., Houston, Beaumont, Wichita Falls, El Paso, Fort Worth and San Antonio
Represented in Canada by Railway & Engineering Specialties, Ltd., Toronto, Montreal, Winnipeg

A NATION-WIDE WELDING and CUTTING SUPPLY SERVICE



Exactly a quarter-century of USE has established Allen *COLD-DRAWING* Process as the method of making a structurally sound Hollow Screw. *Cold-drawing* the sockets of hollow screws avoids bending or spreading the fibres of the metal — whereas bending, spreading or stretching the fibres weakens the structure of the steel by breaking the cohesion of the fibre bundle.

Allen *COLD-DRAWING* packs the fibres of steel *more closely together;* increases cohesion and density of the metal; actually *compresses* more strength into a given diameter of screw. Supporting the theory, engineers know that Allen *COLD-DRAWING* has *worked* — 25 years. Millions of examples of the product function dependably in machines. *There* you recognize the PRACTICAL.

Samples for trial or test sent gratis in styles and sizes specified.

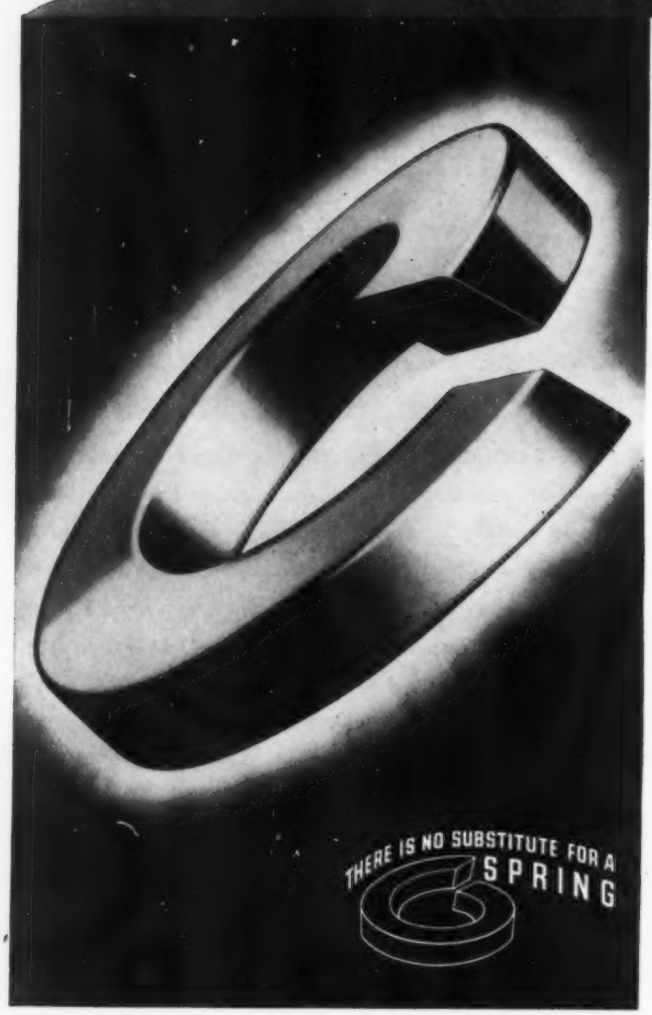
THE ALLEN MFG. COMPANY

HARTFORD, CONN. U.S.A.

Sole European Distributors: **S. RALPH GOLDING & CO.,** ★ **15 MALLOW STREET, OLD STREET,** ★ **LONDON, E. C. 1.**

IT TAKES *Live Action*

TO COMPENSATE FOR WEAR AND LOOSENESS



only a SPRING WASHER has

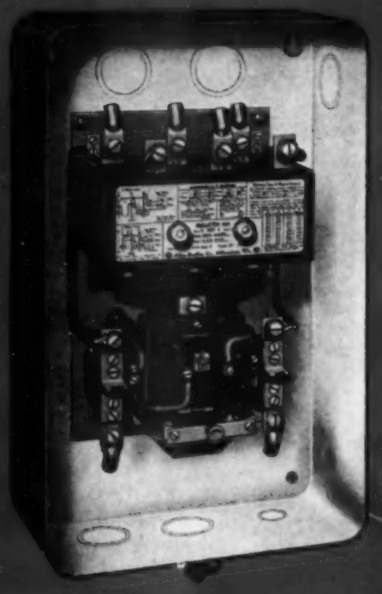
Live Action!

Longer wearing . . . . smoother running . . . that's what the Spring Washer does for a product! All because it has *Live Action!* A *live,* continuously working part . . . . functioning as a spring . . . . with sufficient range of action to retard wear and looseness.

SPRING WASHER INDUSTRY

A REMARKABLE LINE OF MOTOR STARTERS

DESIGNED for



The attractive appearance and simplicity of Bulletin 709 Starters make them an asset to any modern machine.

MACHINE BUILDERS

BULLETIN 709 AUTOMATIC SOLENOID STARTERS

The smallest starters on the market—that's one big reason why the Bulletin 709 line of automatic solenoid starters is so popular with machine builders.

Another important reason is the unique design, using a self-insulated starter mechanism, which can be mounted directly on metal machine bases without additional insulation.

The compact design permits the mounting of several starters, side by side, in a surprisingly small space. This is a very attractive feature for manufacturers who assemble their own control panels within machine housings.

Size 1
Max. Rating
5 H. P., 220 V.
7½ H. P.
440-550 V.

Size 2
Max. Rating
15 H. P., 220 V.
25 H. P.
440-550 V.

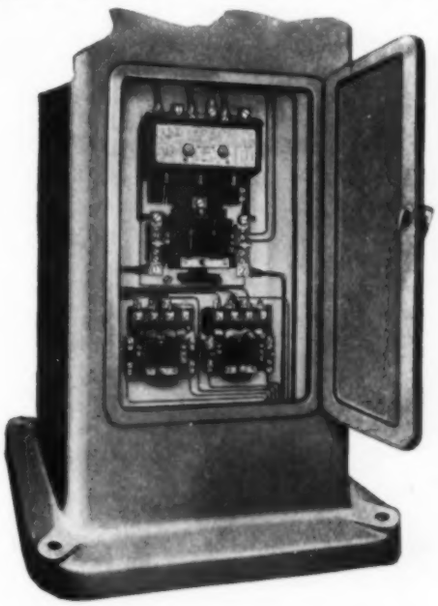
Size 3
Max. Rating
30 H. P., 220 V.
50 H. P.
440-550 V.

Due to the inherent efficiency of the solenoid structure, the drop-out voltage is remarkably low. Therefore Bulletin 709 starters will remain in operation despite poor line voltage conditions. The double-break patented silver-alloy contacts require no maintenance.

There is a wide selection of standard enclosing cabinets for every imaginable service—each type the smallest of its class on the market. Send for the new Allen-Bradley Bulletin 709 literature today.

ALLEN-BRADLEY CO.
1310 S. Second St.
Milwaukee, Wis.

ALLEN-BRADLEY



Compact

CAN BE MOUNTED IN MACHINE BASES DIRECTLY ON METAL

View of three Bulletin 709 Starters installed in a machine base. These compact starters fit easily into spaces that are too small for ordinary starters.

Yes

BOOTH No. 405

SURFACE GRINDERS

You'll find "Better Net Profits" written all over our latest achievement . . . *the* NEW 3-B

A 24" x 8" x 12" Automatic Surface Grinding Machine for the most exacting work—equally valuable for the tool room or for many types of production work. Powerful, fast, and accurate beyond all previous standards for machines of this type and size. Check the following advantages while in our booth at the show.

***Greater Precision*—because of the heavy one-piece well-ribbed bed casting, deep saddle, heavy spindle, and practical elimination of vibration.**

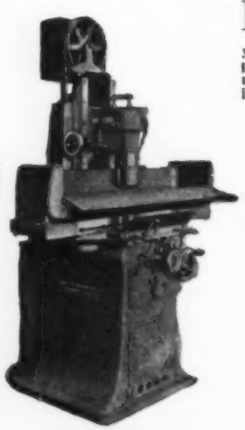
***Greater Speed*—because the shock of table reversal is eliminated by an oil shock absorber built into the transmission case.**

***Greater Durability*—because the spindle is 1⅛" diameter, made of chrome steel, hardened and ground, and fitted to an adjustable phosphor-bronze box at the front, and super-precision ball bearings at rear. The whole spindle assembly is mounted in a cartridge-type sleeve which is removable for inspection and repairs.**

And here are three other ABRASIVE EXHIBITS *that you can't afford to overlook:*

FACE GRINDER

For rapid and accurate production of flat surfaces, you can't equal this machine. Its outstanding feature is the great rigidity between the work table and the revolving abrasive ring, and the ease with which fixtures or special holders can be applied to bring the work into grinding contact. Within its field, and for the moderate investment required, we believe this machine affords the cheapest method in the world of producing accurate flat surfaces.



No. 33

No. 33 **If you're after high production on small or medium-sized work you'll be interested in this service-proved vertical spindle machine with unit-cast frame for rigidity. Capacity 22"x7"x12" automatic except for traverse feed. All high-speed shafts and pulleys are carried on highest grade ball bearings, and there are no exterior moving parts or belts whereby the operator can possibly be injured.**

No. 1½ **How often have you wished that you could grind just a little wider or just a little higher? Here is the machine which can do it with utmost accuracy and at a very low investment. Capacity is 15"x10"x12", and all feeds are operated by convenient hand wheels—thus saving time and money on tool room jobs where automatic feeds are not required. Since the motor is an integral part of the head there are no fast moving parts except the spindle, and vibration has been practically eliminated.**

No. 1½

ABRASIVE MACHINE TOOL COMPANY

EAST PROVIDENCE, R. I., U. S. A.

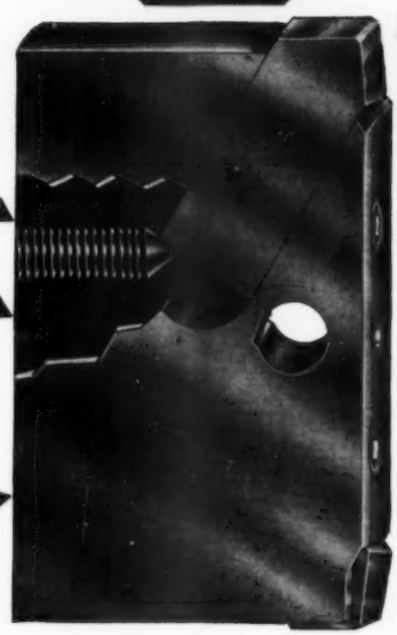
For Accuracy-Speed-Economy Davis Expansion Boring Tools

Note These 6 Important Features

1. CUTTER SUPPORT SCREWS expand and support blades. Cutting thrust pressure is taken by these sturdy screws, which come in contact with blades at an angle which does not allow screws to vibrate loose under severe conditions.

2. CENTERS, accurately located with relation to Tapered Locating Hole, permit grinding of the blocks between centers, eliminating the need of grinding arbors.

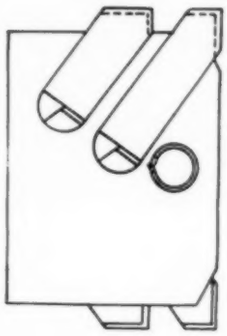
3. BLOCK BODY, made of specially rolled alloy tool steel of a quality which may be hardened for cutting tools. Made up to the largest practical dimensions, considering the bar diameters and bores for which it is recommended.



4. CUTTING BLADES, manufactured with greatest precision possible are interchangeable within type and size limitations. Blades are the largest practical size considering block dimensions, which insures proper heat radiation and maximum cutting life.

5. TAPERED LOCATING HOLE centralizes the block perfectly and when located in position brings the block firmly up against the back and bottom of the slot, giving the block a perfect and evenly distributed bearing the full length of the slot.

6. CUTTER LOCK SCREWS clamp the blades firmly and rigidly in position, forcing blades back against the support screw and firmly up against the top of blade slot, forming an extremely rigid and substantial tool.



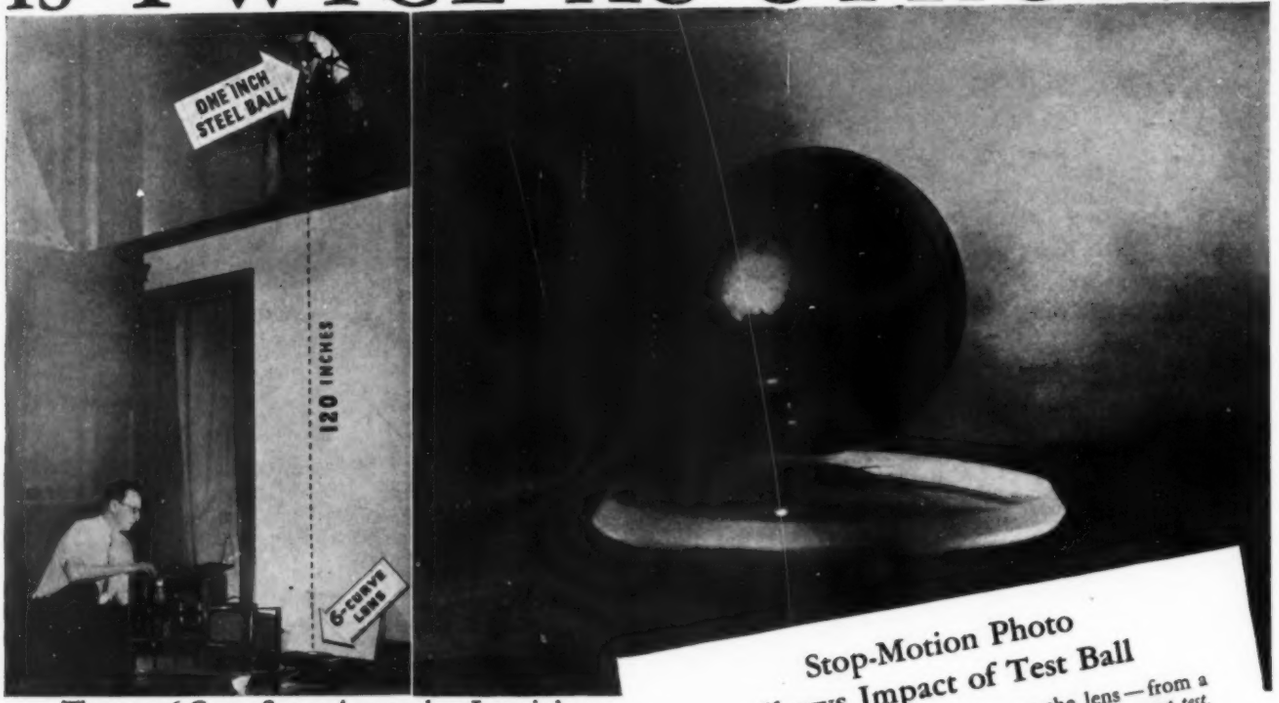
Davis Expanding Blocks are furnished in sizes for boring diameters from ¾" to 18" inclusive. Blocks can be furnished with H.S.S., Cobalt, Stellite, or Tungsten-Carbide Tipped Cutters. Send prints or samples of your work and we will gladly submit our tooling recommendations especially designed to meet the conditions and requirements of your plant. No obligation. Write us today.

DAVIS BORING TOOL COMPANY, Inc.
Division Larkin Packer Company
6200 Maple Avenue St. Louis, Mo.

DAVIS BORING TOOLS

New *6-Curve Super Armorplate* Goggle Lens

is TWICE AS STRONG



Stop-Motion Photo Shows Impact of Test Ball

A one-inch solid steel ball drops on the lens—from a height of 10 feet. *The height is 3 times the Government test. The ball is four times the standard weight.* This unretouched stop-motion photo, taken by Prof. H. E. Edgerton of Massachusetts Institute of Technology, shows what happens. The camera caught the action about .0002 of a second *after* impact. The ball is rebounding . . . the 6-Curve Super Armorplate Lens is unharmed. 6-Curve Super Armorplate lenses withstand impact again and again. Exposure time for this photo: 1/100,000 second. *Below:* the 6-Curve Super Armorplate Lens has 4 times the standard curvature, is more than twice as strong. Patented.

The new 6-Curve Super Armorplate Lens is here . . . a *deeply curved* lens with virtually *twice* the impact resistance of the strongest lens ever used before as standard equipment in American Optical Company goggles.

Objects of twice the *weight* . . . or flying twice as *fast* . . . leave the new 6-Curve Lens unharmed.

6-Curve Super Armorplate Lenses are now available as optional equipment in all new American Optical Company goggles . . . and as replacement lenses for goggles now in service. *All* your workers can have its advantages . . . its more certain deflection of flying particles . . . the liberal eyelash clearance . . . the clear, normal, comfortable vision.

Save eyes and save money. Ask the American Optical Company industrial representative stationed at the branch office near you to show you this new lens . . . explain what it means in terms of the dollars it will save for you.

American Optical Company

Manufacturers, for more than 100 years, of products to aid and preserve vision. Factories at Southbridge Mass. In Canada, Consolidated Optical Co., Ltd. Branch offices in all principal industrial centers

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THE MACHINE TOOL SHOW

LATHES and SHAPERS

which represent the skill and experience of over 60 years of manufacturing machine tools

and

effectually combine design, workmanship and accuracy into operating units which are made for 1935 demands.

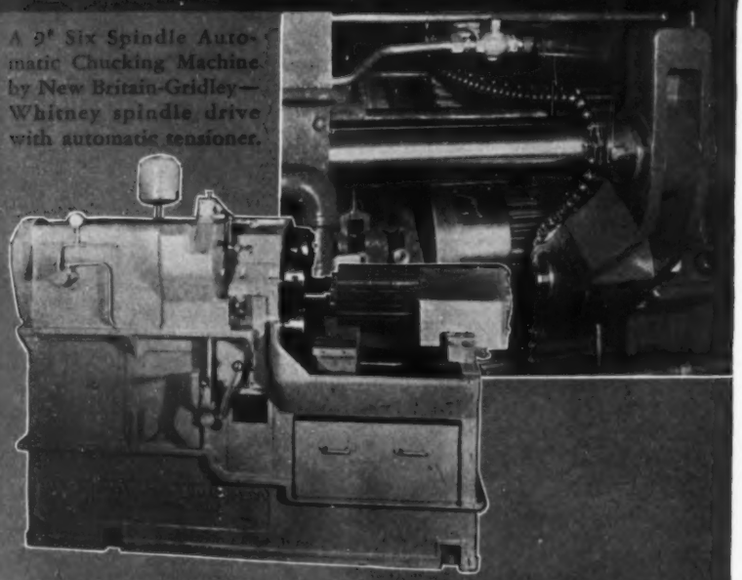
To see and be shown these machines you are invited to Booth No. 402, New North Annex.

THE HENDEY MACHINE COMPANY

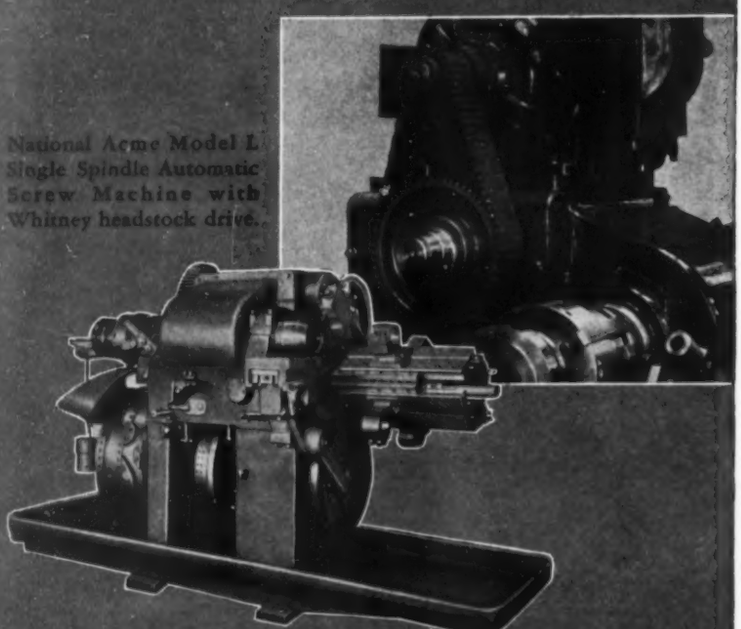
TORRINGTON CONNECTICUT

Chain Drives

ON MODERN MACHINE TOOLS



A 2" Six Spindle Automatic Chucking Machine by New Britain-Gridley—Whitney spindle drive with automatic tensioner.



National Acme Model L Single Spindle Automatic Screw Machine with Whitney headstock drive.

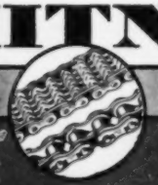
JUDGED by every standard of power transmission performance, Chain Drives meet the most exacting requirements. Power when it is needed, constant speeds without slippage, capacity to handle sudden overload demands — these are a few of the many advantages which combine to make Chain Drives the recognized standard for dependable power transmission.

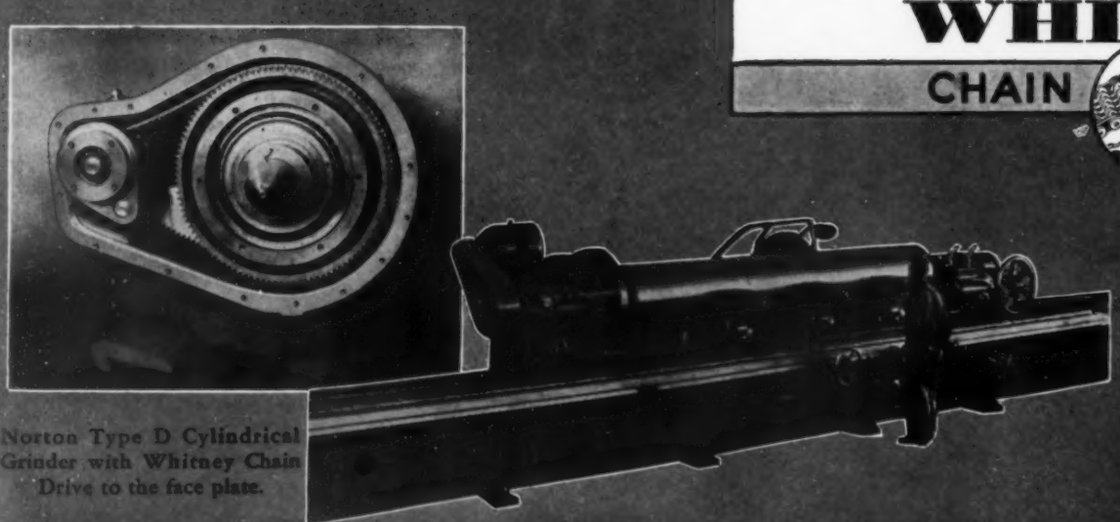
Whitney Chain Drives offer important economies because they maintain production, are moderate in initial cost and eliminate excessive maintenance expense.

Whitney Chain and Whitney Engineers have solved many difficult machine and plant drive problems. Write today for catalog A and further information.

THE WHITNEY MFG. CO., Hartford, Conn.

WHITNEY

CHAIN  **DRIVES**



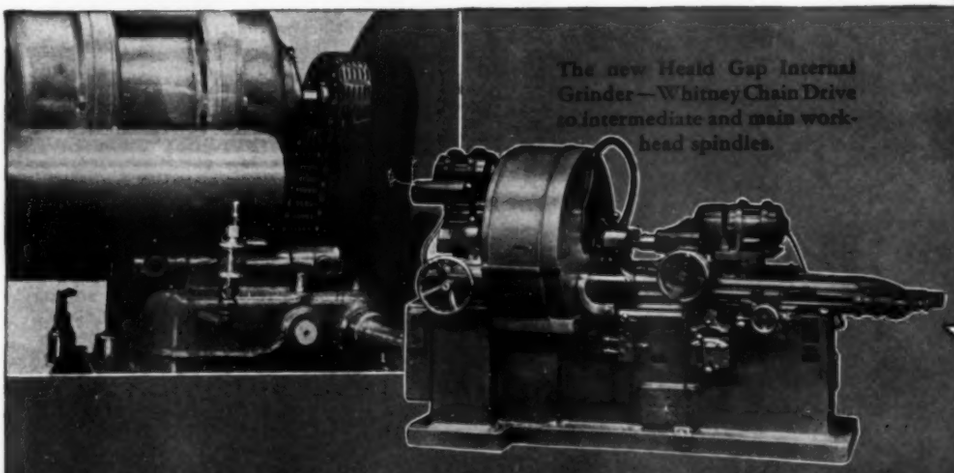
Norton Type D Cylindrical Grinder with Whitney Chain Drive to the face plate.

AT THE SHOW
BOOTH A-315

give These Performance Features

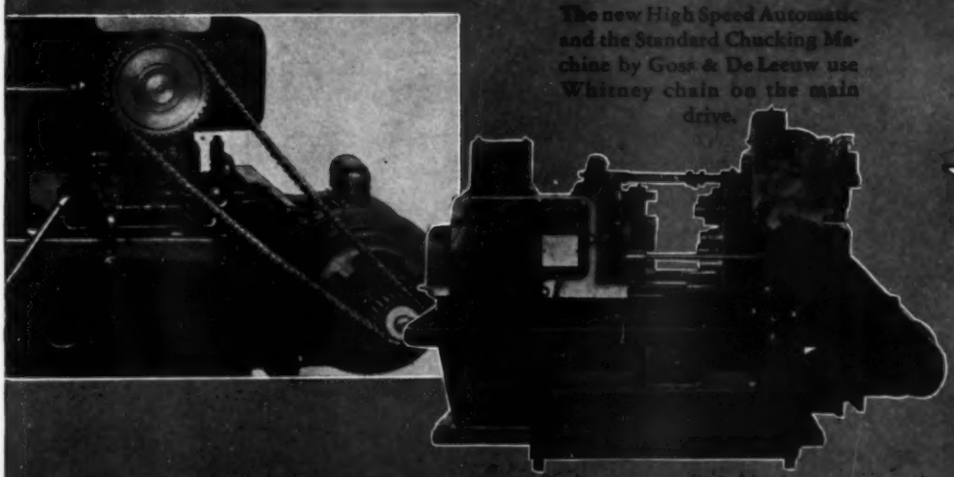
★ POSITIVE POWER

★ CONSTANT SPEEDS



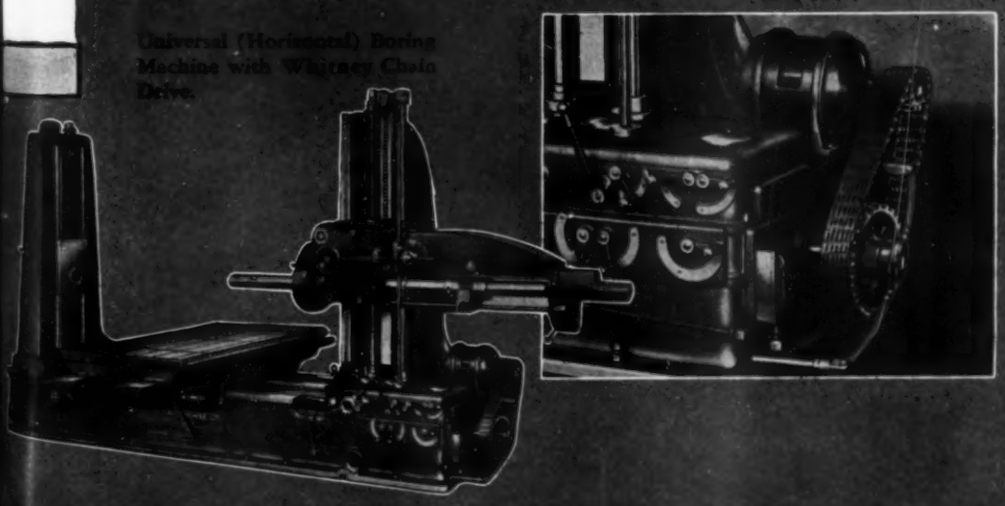
The new Heald Gap Internal Grinder—Whitney Chain Drive to intermediate and main work-head spindles.

★ FLEXIBILITY OF DESIGN



The new High Speed Automatic and the Standard Chucking Machine by Goss & De Leeuw use Whitney chain on the main drive.

★ OVERLOAD CAPACITY



Universal (Horizontal) Boring Machine with Whitney Chain Drive.

★ LOW MAINTENANCE COSTS

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1935 RIVETING MACHINE SHOW

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TODAY'S highest development of the famous blowless, noiseless method that has been cutting costs, speeding production and improving product quality for the past 27 years. Unquestionably the fastest and most accurate known method for a broad range of production assembly. Speed is limited only by the operator's dexterity in feeding. Tension of rivets under precise control. Grant equipment embodies every picture for constant high speed operation. Let us demonstrate on your own work. Send samples for free production analysis.

Pedestal type, vertical motor drive, capacity 7/16" throat 5 5/8".

Typical bench type vertical motor drive machines, capacity 3/8" throat 2 1/2" and bench type, belt-drive two spindle machine, capacity 3/8" steel or iron, 1/2" brass, bronze, etc.

FASTEST KNOWN METHODS FOR ALL PRODUCTION RIVETING

GRANT SPECIAL MACHINERY

TRIED and proved Grant production methods and equipment have been made the basis for many highly successful, cost-cutting special machines . . . including dial-feed mechanisms and time saving fixtures for unusual parts. Send samples or blueprints for engineering help without obligation.

We also make automatic machines for chamfering, facing and burring both ends of bushings simultaneously and for threading ends of studs, rods, tubing, etc. Write for details and specifications.

Pedestal type direct motor drive two spindle vivet spinning machine. Capacity steel 1/4"; brass, bronze or aluminum 3/8".

GRANT ROTARY VIBRATING RIVETERS

MANY new features and aids to high speed operation make Grant the outstanding line of vibrating riveters on the market today. Riveting tools butt solidly against lower end of spindle to insure a snappy positive blow, and are made from hexagon stock to permit easy removal with a wrench. Rotation of the hammer prevents loosening of the tools in operation.

Grant Vibrating Riveters are made in all standard single and multiple spindle types from 3/32" to 5/8" and in special forms to meet all requirements. Send us samples of your own work for free analysis.

Bench type Vibrating Hammer, capacity 1/8".

Standard and deep throat heavy duty pedestal type machines. Capacity to 3/8".

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Make Possible
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Faster Cutting Speeds — Heavier Feeds — Higher Loads — Greater Precision — New Alloy Steels — these will be the topics of conversation as machine tool builders display the products of their engineering genius.

But without modern lubricants these machines could not be operated. D. A. Stuart & Co. have kept pace with improved machine tool design, and at Cleveland will show, explain, and demonstrate the advantages of STUART metal working oils and the newly developed Extreme Pressure ("EP") Lubricants for gear heads, spindles, and slides.

There is a STUART Oil for every purpose in the metal working industry. See the attendants at the STUART Booth at Cleveland — or, if you won't be there, call in the local D. A. Stuart & Co. representative — and let him explain why STUART OILS are used and recommended by the best-known names in the machine tool industry and by the largest production plants in the United States and Canada.

Write for copy of new STUART publications "Modern Cutting Fluids" and "What's New in Grinding Lubrication."

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"STURACO" ★★★★ EXTREME PRESSURE ("E.P.") GEAR AND BEARING LUBRICANTS FOR INDUSTRIAL PLANTS

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BEFORE YOU DESIGN, BUILD OR BUY MACHINERY

. . . GET THE FACTS ABOUT HELE-SHAW *Fluid* POWER

In the usual sense, the Hele-Shaw pump is not a "pump" at all; it is a *generator* of Fluid Power and bears a striking resemblance to an electric generator in appearance and action. It produces power in the form of oil under pressure in motion, power which may be piped almost as readily as current is wired.

Fluid Power, taken directly from the Hele-Shaw pump, is capable of producing infinitely, instantly variable, reversible *linear* motion, and is quite naturally and widely used in the operation of hydraulic machinery.

If, on the other hand, Fluid Power from the Hele-Shaw Pump is shot through a Hele-Shaw motor the result is infinitely, instantly variable, reversible *rotary* motion.

The applications for variable, reversible Fluid Power are probably endless* but they require a thorough knowledge of machinery and manufacturing processes. It's a habit with us to give each individual problem careful consideration—from the ground up if necessary.

**You'll find many applications for Fluid Power in Pages 6, 7 and 8 of the new Hele-Shaw Catalog, copies of which are available now to engineering, designing and manufacturing executives. Send for it.*

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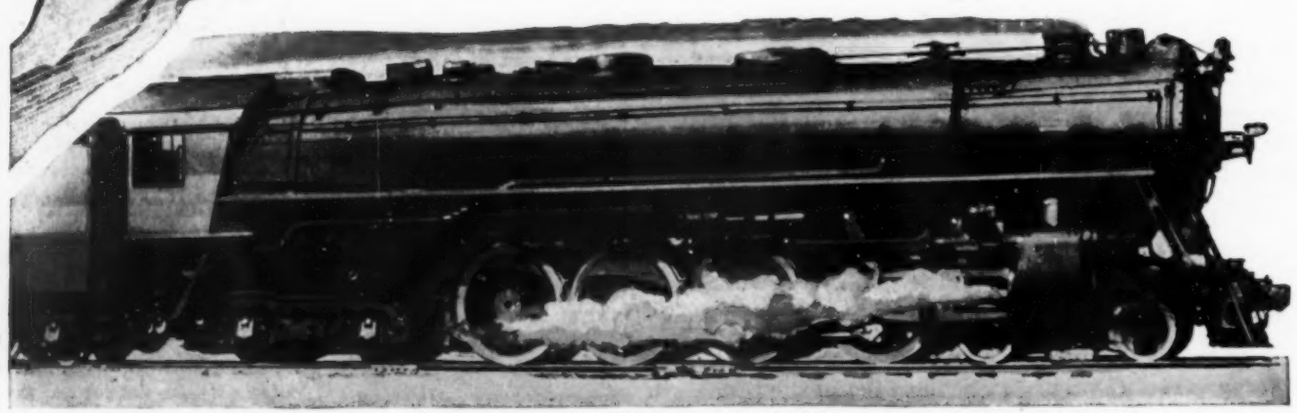

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United States Steel U·S STEEL *Corporation Subsidiaries*

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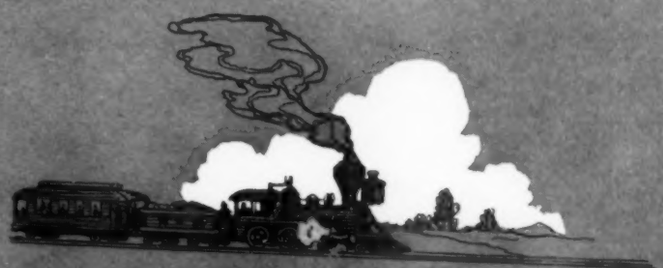

FOUNDED WHEN LOCOMOTIVES WERE WOOD BURNERS

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CARBURIZERS

PERLITONIZING

QUENCHING OILS

LIQUID BATHS

CUTTING OILS

RUST PREVENTIVES

METAL CLEANERS

VIM TRED LEATHER BELTING

VIM LEATHER PACKINGS

INDUSTRIAL LUBRICANTS

. . . . presenting the HOUGHTON L

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Houghton has been definitely aligned with the science of carburizing since its development of the first uniform patented carburizing material—Hydrocarbonated Bone Black—in 1872. Its energized type of carburizers—PEARLITE and QUICKLIGHT—are used by the millions of pounds for carburizing by pack hardening, with economy, speed and efficiency.

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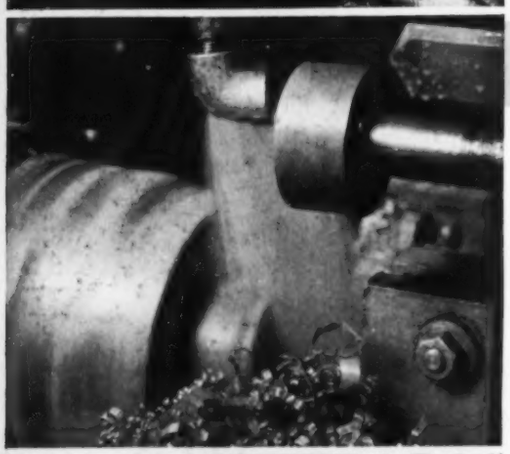

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New high-film-strength straight cutting oils and bases that meet modern machining requirements, save regrinds, impart a fine finish to the work. Also a complete line of soluble cutting oils that have stood the test of time in years of efficient service as cutting coolants.

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An exclusive Houghton development for carburizing in a liquid salt bath, which provides a true eutectoid case up to .040 inch in thickness, and which is particularly adapted for small parts where speed, uniformity of depth of case and carbon content, and economy are required. Now used by leading heat treaters in this country and abroad.

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A series of Liquid Heats and Draw Temps for annealing, tempering, drawing, normalizing and hardening, meeting all requirements of the metal industry. Also a superior line of Surface Hardening Powder and Blocks, Cyanides, and every approved method of transferring heat from a hot liquid to a cold solid. Increased production at lower cost is the Houghton slogan.

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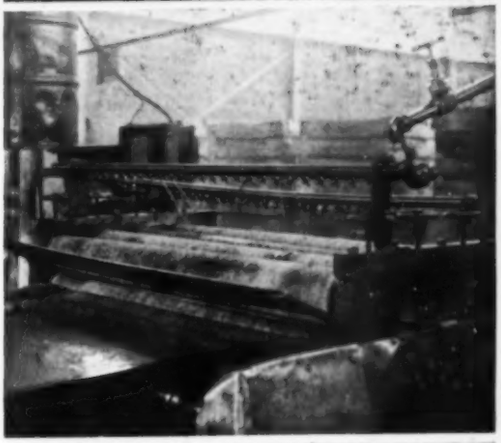
Rust Veto—used by the U.S. and foreign governments as rust preventives during the war . . . used by famous aviators and polar expeditions to protect planes from salt water and air. Made in a variety of types for every purpose and material from a battleship to a needle.



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Here is Houghton's outstanding accomplishment in the field of general industrial lubrication—a complete line of tough-film, leak-resistant lubricants possessing the greatest load-carrying capacity. Made in four general series ranging in service from light to heavy duty machines and gears. Both oil consumption and oiling labor cost are cut as much as one-half in proven cases by using STA-PUTS.

70 years
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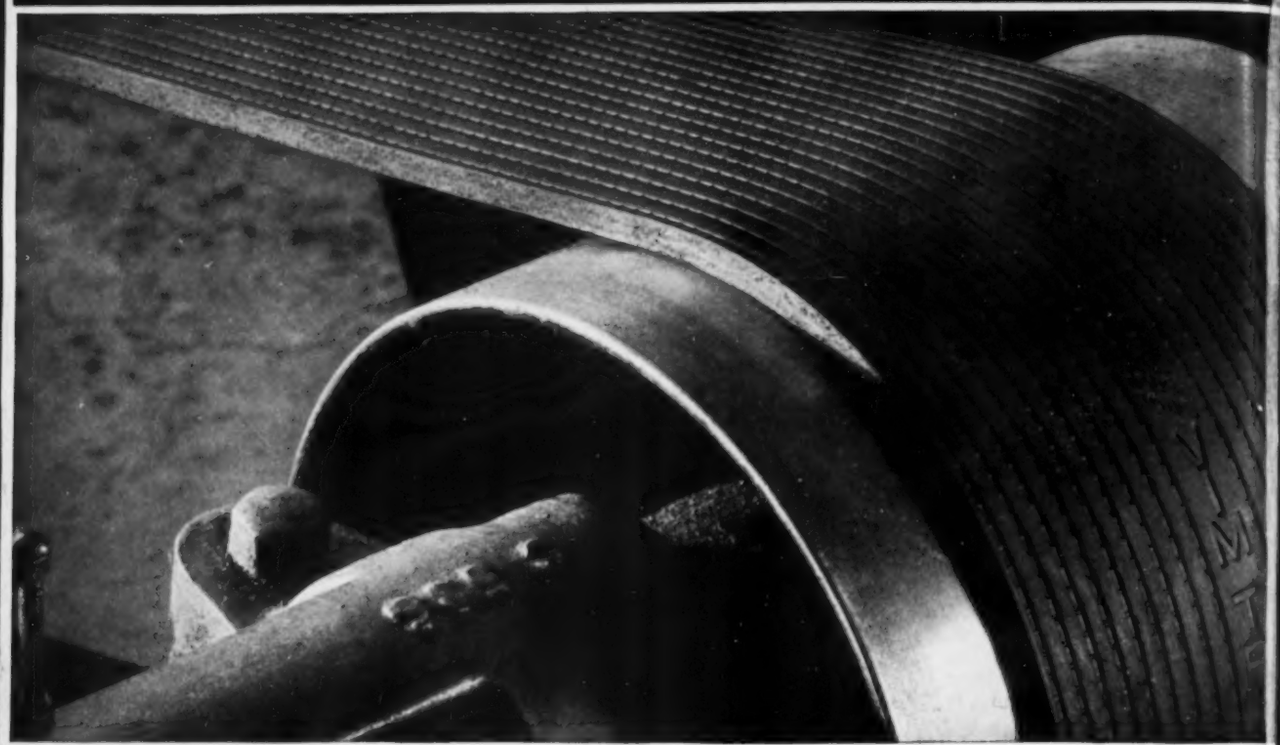
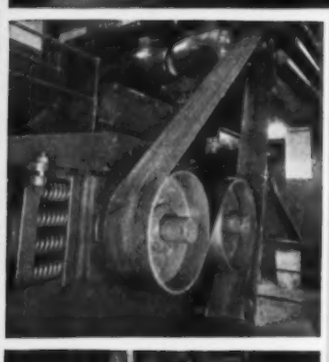
ROUNDING OUT *the* HOUGHTON LINE





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LEATHER BELTING

Made from VIM Leather, live and resilient, highest in tensile strength, tanned from heavier hides by an exclusive process superior for forty years.

Result: A belting leather with longer, tougher fibers, greater flexibility, and the property of great elasticity which minimizes shocks, permitting the belt to stretch under sudden load, then recoil to its original length and take up the load.

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Address Inquiries to 240 W. Somerset Street, Philadelphia, Pa.

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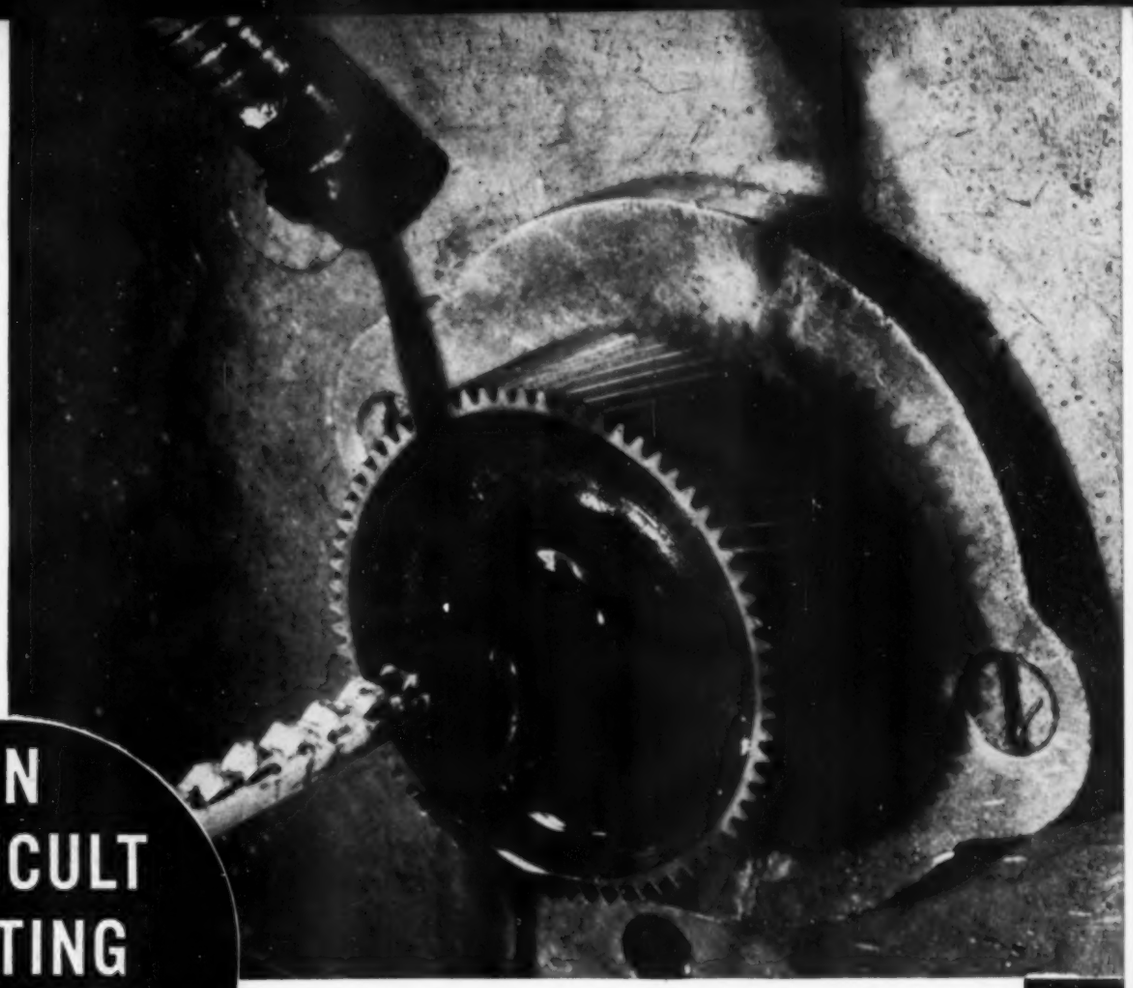

ON DIFFICULT CUTTING OPERATIONS ★

VITAL, both to quality of work and cost of operation, the selection of *correct* cutting oils becomes a factor of *increased importance* on cutting operations that are difficult.

The personal help of men from your local Standard Oil (Indiana) office might definitely enable you to increase speeds, feeds, or depth of cuts, without jeopardizing quality—or it might enable you to make direct savings by a slight change in practice. Such help is constantly doing these things for others.

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ACME CUTTING OILS (*dark colored – in four grades*) *–Low cost oils, containing only mineral oils and sulfur. Stable, non-irritating and will not turn rancid.*

PREMIER OILS (*light colored–in two grades*)*–Transparent to permit visibility of work – yet contain large amount of sulfur in stable chemical combination.*

ALSO . . .

SUPERLA SOLUBLE OIL, ACME BASE OIL, STANO-STAMP, STANDARD CUTTING COMPOUND

AND . . .

cutting fluids compounded with animal and vegetable oils, forge die lubricants, etc.

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STANDARD OIL COMPANY (INDIANA)

CORRECT LUBRICATION

Practical answers to the lubrication problems met in metal working will be found in the booklets listed in the coupon at the right. Check those you desire, and attach a list of any other problems on which helpful information would be welcome right now.

Stop at Booth S-4, in the Arena Section, at the Machine Tool Exposition. Standard Oil (Indiana) Engineers will be there, ready to discuss problems with you, glad to make helpful suggestions.

Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago, Illinois, (166)

Gentlemen: Kindly send copies of the papers checked to the undersigned. It is understood that no obligation is implied.

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(attach list of any additional subjects in which you are specifically interested .....)

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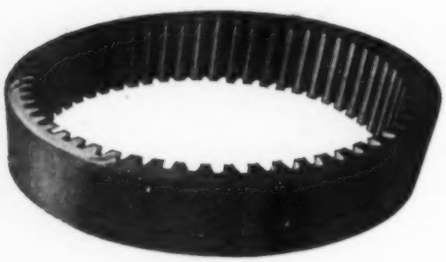
City.....*State*.....

—and now a larger Plant to

Continuous Tooth Herringbone Gears

Spiral Bevel Gears and Pinions

Ground Thread Worm and Worm Gear



Internal Gear

In 1929 we built one of the largest and most modernly equipped plants for the production of Gears and Speed Reducing Units. Now we are adding 25,000 additional square

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ECONON

PHILADELPHIA GEARS

For nearly a half century Philadelphia Gears have set a standard of comparison for quality and workmanship, and our plant has become known far and wide as GEAR HEADQUARTERS. In addition, we've acquired a reputation for our cooperation on Hurry Orders and Breakdown jobs. Spur Gears, Herringbone, Worm, Spiral-Bevel, Miter, Helical, Internal, Intermittent, Non-metallic Gears, Pinions, Racks, Ratchets and Pawls—are all made, in various sizes, by Philadelphia Gear Works.

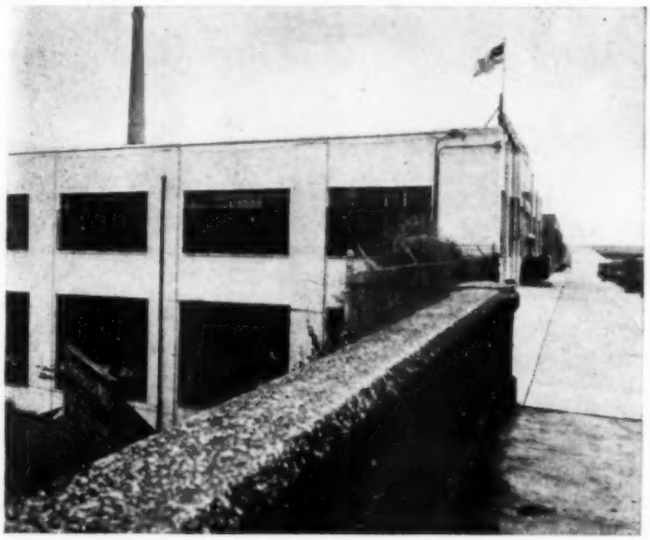
Send for the latest 48-page Gear Book.

PHILADELPHIA

ERIE AVE. & "G" ST.,

Branch Sales
NEW YORK, 330 W. 42nd Street—

meet increased demands



feet of space to take care of the increasing demand for Philadelphia Products. We cordially invite Gear Buyers to inspect our Shop, Facilities and Products.

NIZE and MIZE with

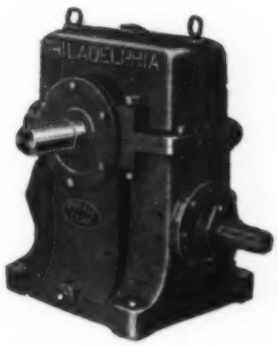
PHILADELPHIA SPEED REDUCERS

We were one of the Pioneers in the development and manufacture of Industrial Speed Reducing Units, and we have continuously kept abreast of the times,—so that today, Philadelphia Speed Reducers are used throughout the country for every conceivable purpose. They are available in various sizes of Worm Gear, Herringbone Gear, Spur Gear and Spiral-Bevel Gear Types—for any horsepower and speed reduction ratio.

Then, too, there are the latest self-contained, widely used Philadelphia MotoReduceRs with efficiencies up to 97%. These Units are compact and noiseless and require no extra base plate or flexible coupling.

They last a lifetime because they're accurately and ruggedly built and hermetically sealed against Dirt, Dust, Fumes or Moisture. The Philadelphia MotoReduceR is available in single, double or triple reduction, with ratios up to 450 to 1—and the Motor Unit may be of standard open type or totally enclosed fan cooled (single or polyphase). D. C. Units may be had up to 10 h.p.

Send for latest Speed Reducer Catalogs.



Worm Gear Reducer

Herringbone Speed Reducer

Vertical MotoReduceR

Horizontal MotoReduceR

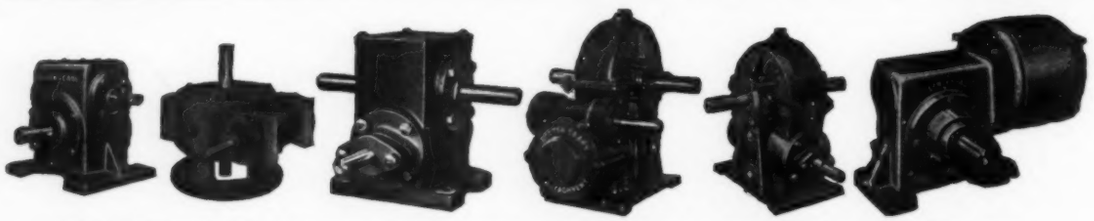
GEAR WORKS

PHILADELPHIA

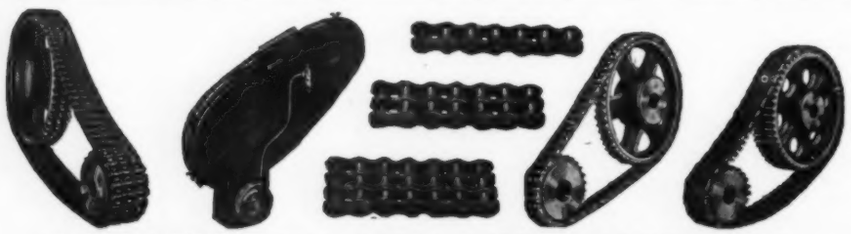
Engineering Offices
Pittsburgh, Chamber of Commerce Bldg.

THIS GREAT SHOW of

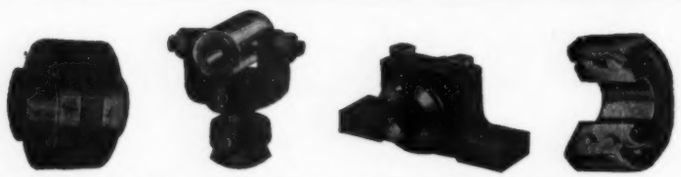
GEARS—SPUR, WORM, BEVEL, INTERNAL, MITER, SPIRAL, NON-METALLIC, ETC.



SPEED REDUCERS—HORIZONTAL, VERTICAL, PARALLEL, MOTORIZED, COMPOUND, ETC.



CHAIN DRIVES—ROLLER, SILENT. CHAINCASES, SPROCKETS, ETC.



MISC.—BALL BEARINGS, JOINTS, COUPLINGS, ETC.

THOUSANDS OF TYPES AND SIZES *"from stock"!*

SEND FOR CATALOG AMS950

BOSTON GEARS

MODERN MACHINE TOOLS

reminds us again of the importance of using *high quality and efficient power transmission products* . . . to obtain maximum results.

MEMBER OF AGMA

For this reason, many Boston Gear *Stock* Products are incorporated in the modern machine tools which will be on display in Cleveland.

BOSTON GEAR *STOCK* PRODUCTS ARE AVAILABLE IN THOUSANDS OF TYPES AND SIZES, AND ARE CARRIED IN STOCK IN PRINCIPAL INDUSTRIAL CENTERS OF THE COUNTRY.

To all those attending the Machine Tool Show and to all others who are interested, we extend a cordial invitation to visit our Cleveland branch, 211 St. Clair Avenue, N.W.

BOSTON GEAR WORKS, Inc.

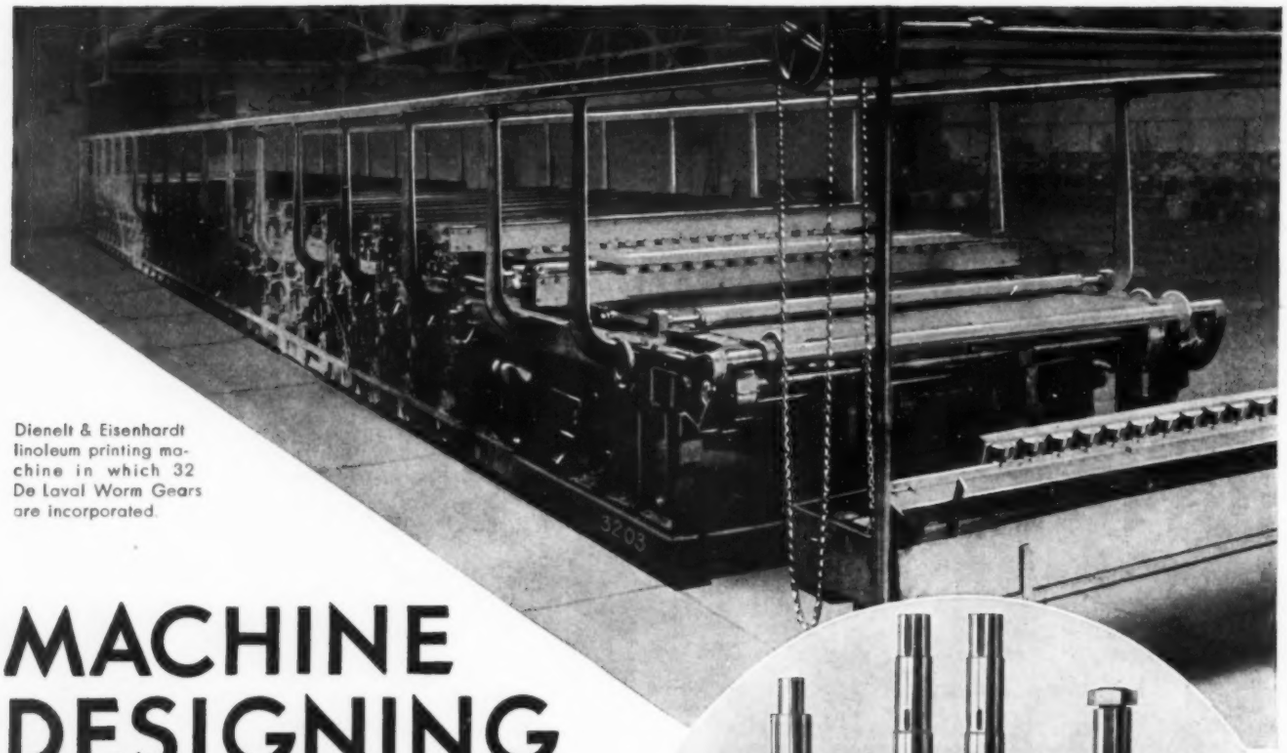
North Quincy, Massachusetts, U. S. A.

Direct Factory Branches in Boston, New York, Philadelphia, Cleveland, and Chicago. Sales Offices in Utica, N. Y., Dayton, Ohio, Springfield, Mass., Greensboro, N. C., and Minneapolis, Minn.

Distribution Centers from Coast to Coast.

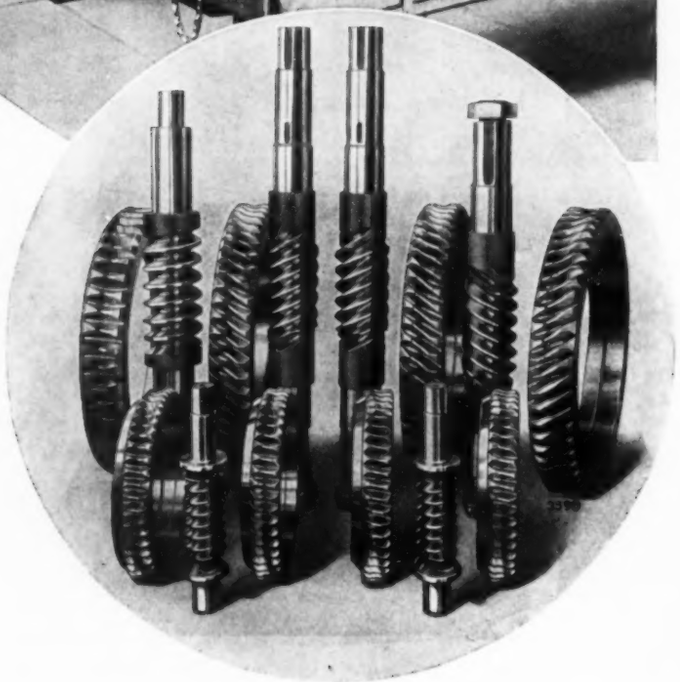
A. T. & T. Co. TELETYPE—QCY MASS 242

BOSTON SPEED REDUCERS



Dienelt & Eisenhardt linoleum printing machine in which 32 De Laval Worm Gears are incorporated.

MACHINE DESIGNING IS THE ART of combining *Harmoniously* TRIED AND TESTED ELEMENTS



By adopting standard center distances and ratios for

DE LAVAL WORMS AND GEARS

or complete De Laval Worm Reduction Units, including casings and bearings, the alert designer makes available speed transformers in which are incorporated the final results of years of study, trial and testing. He also gains the benefit of expert advice and judgment based on intense specialization and extensive practical experience. Instead of assuming responsibility for the reliability and efficiency of his gearing, he receives a guarantee of performance from a responsible company using suitable heat treated alloys, scientific design and modern precision, limit gage methods of manufacture.

●

● *Describe your requirements so that our engineers may submit data and specifications*

1088

De Laval *Steam Turbine Co.*, **Trenton, N.J.**

Manufacturers of Steam Turbines, Centrifugal Pumps, Propeller Pumps, Rotary Displacement Pumps, Centrifugal Blowers and Compressors, Worm Gears, Helical Speed Reducing Gears, Hydraulic Turbines, Flexible Couplings and Special Centrifugal Machinery. Sole Licensee of the Bauer-Wach Exhaust Turbine System.

STAHL GEARS

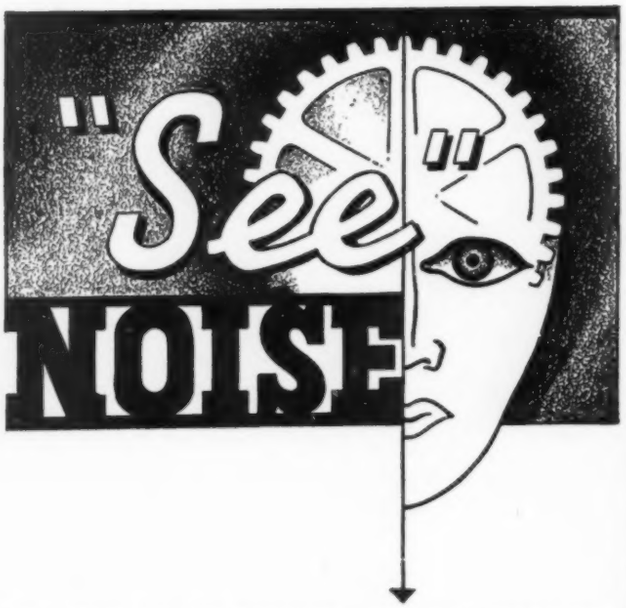
Stahl punch press clutch gear 1½ tons—80% semi-steel.

● The two jobs illustrated are typical of the wide variety of gear work handled by the Stahl organization.

Whether your requirements call for gears weighing tons, extremely accurate rack and pinions, helical gearing or small worm wheels, you can depend on Stahl.

While in Cleveland at the Machine Tool Show make it a point to consult us on your gear problems.

Special Rack — 199 teeth — spacing and pitch line held uniform to limits.



AT THE MACHINE TOOL SHOW

STRANGE as this may seem, you will have an opportunity to "see" noise at the Machine Tool Show. The Synthane demonstration will give you a chance to compare by sight (and ear, too) the noises generated by metallic and SYNTHANE SILENT STABILIZED (laminated bakelite) gears. This feature and many other interesting SYNTHANE developments make up an exhibit worth "seeing".

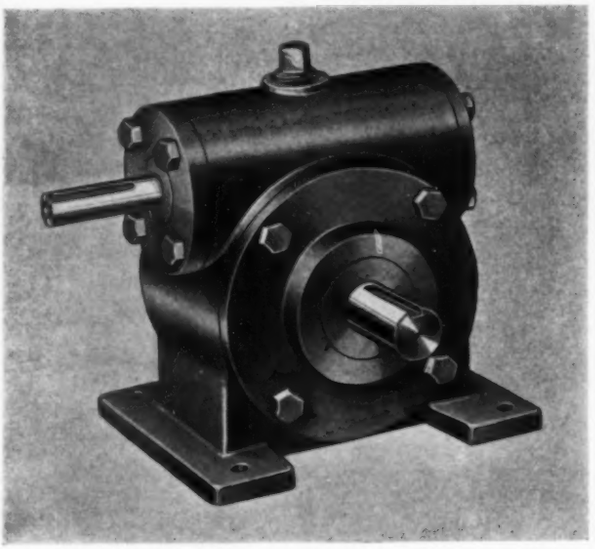
Booth A-404

1935 MACHINE TOOL SHOW
CLEVELAND SEPT. 11-21

SYNTHANE LAMINATED BAKELITE
SHEETS • RODS • TUBES
• FABRICATED PARTS •
SYNTHANE SILENT STABILIZED GEAR MATERIAL

SYNTHANE
CORPORATION OAKS · PENNA

GRANT SPEED REDUCERS



Here is another example of the complete Grant line of Speed Reducers. Fractional h.p. unit. Worm type. Gear shaft, vertical and horizontal. Ratios up to 69 to 1.

Your inquiries will receive prompt, expert attention.

GRANT GEAR WORKS, BOSTON
ESTABLISHED 1877

Let Us Be Your "Gear Department"

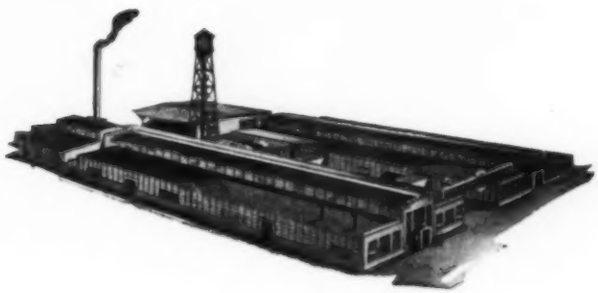
Many manufacturers have found this more profitable. It has solved some difficult problems, reduced their gear expenses and secured better gear quality. To this work we bring long experience, modern equipment and skilled workmen. Large or small orders filled with precision, speed and accuracy.

Send us your prints and specifications . . .

HOW MUCH CAN WE SAVE YOU?

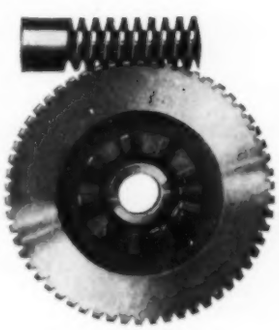
THE CINCINNATI GEAR COMPANY
CINCINNATI OHIO

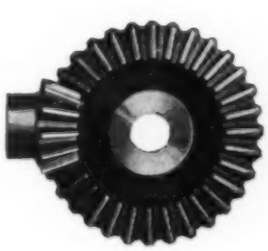
Here's OUR GEAR EXHIBIT



OUR modern factory contains more than 70,000 sq. ft. of floor space equipped with the most efficient machinery—much of it especially designed, and not found elsewhere. Long experience, large volume, and correspondingly low overhead, enable us to furnish worms and gears of the highest possible quality at mass production prices.

Get our figures for furnishing part or all of your gear requirements, and compare them with your present costs. You'll find an opportunity for new margins of profit.





PERKINS

MACHINE AND GEAR COMPANY

130 CIRCUIT AVE., SPRINGFIELD, MASS.

CELORON
SPOKE GEARS

PROVIDE EXTREME RESILIENCE

The Celoron Spoke Gear, developed for the automotive industry to further reduce noise and increase life of timing gears, has a much wider field—can be used to advantage in many mechanisms—will do for industry in general all it has accomplished for automotive manufacturers.

Here is a gear that is resilient—that absorbs starting torque—reduces noise, even after considerable wear—greatly increases gear life. We should like to tell you more about it.

CONTINENTAL-DIAMOND FIBRE CO.

NEWARK, DELAWARE

GEARS - WORMS - CAMS - MADE TO ORDER

HARTFORD GEARS

THE HARTFORD SPECIAL MACHINERY CO., Hartford, Conn.

CROSS

Gear Tooth Rounding, Pointing, Chamfering and Burring Machines—full hydraulic operation and control—no cams—three different machines, each operating on an entirely different principle—one will meet your requirements.

CROSS GEAR & MACHINE COMPANY
3250 Bellevue Avenue Detroit, Michigan

GANSCHOW

NEW
VARIABLE SPEED UNIT AND
LAMINATED NOISELESS STEEL PINIONS

GANSCHOW GEAR COMPANY
1013 WEST WASHINGTON BLVD. CHICAGO, ILL.

GEARS

Spur - Helical - Bevel - Worms - Screws - Racks
Gear Hobbing - Thread Milling - Broaching

THE ADAMS COMPANY (*Est. 1883*) 1900 Bridge St. Dubuque, Iowa

SMALL GEARS

Also
MEDIUM SIZES IN
ALL TYPES AND MATERIALS

Massachusetts Gear & Tool Co.
25 Nashua St. Woburn Mass.

EARLE

THE EARLE GEAR & MACHINE CO.
4723 Stenton Ave.
Philadelphia, Pa.
110 State St., Boston, Mass.
95 Liberty St., New York City

Cut Spur, Bevel and Worm Gears

All sizes. Every description. Operating Machinery for Bridges, etc. "Les Simplex" Cold Metal Saws

GEARS

WALTHAM COST-CUTTING EXHIBITS

are in many modern shops

Shops equipped with WALTHAM SUB-PRESSES, AUTOMATIC GEAR CUTTERS, and THREAD MILLERS have proved their faith in modernization as a means of reducing costs and improving quality.

With the attention of the entire metal working industry focused on better methods, and improved equipment, the time is most opportune to investigate the advantages offered by WALTHAM equipment. We'll gladly place you in touch with a shop near you where you can make a first-hand inspection if you will advise us concerning your problem. In any event write for further details.

Arch Sub Press

WALTHAM

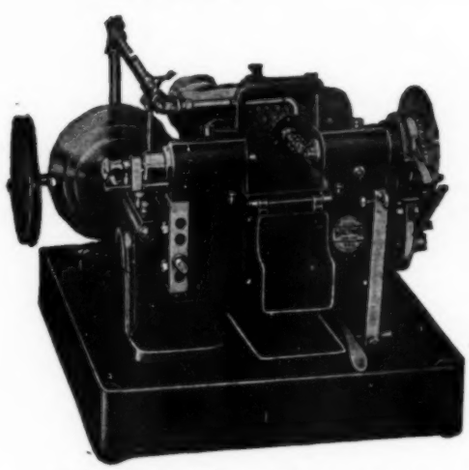
Sub-Presses and Dies

Time saving, an elimination of filing and other hand finishing, and accuracy are available when you modernize stamping methods with Waltham Sub-Presses and Dies.

Work is finished when it comes from the dies.

These units—available in both arch and overhang types—will produce accurate work indefinitely. They are adjustable for wear and therefore always fit closely.

Made in sizes up to 6-inch plunger diameter.



1½" Pinion and Gear Cutting Machine

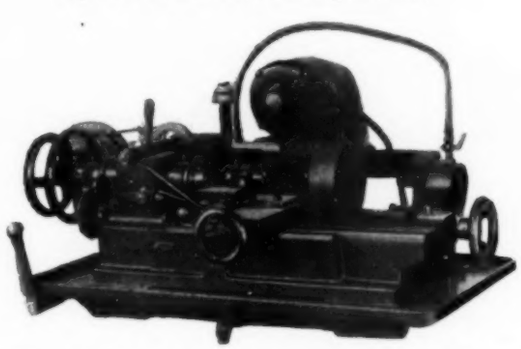
WALTHAM

Automatic Pinion and Gear Cutters

Accurately cut and finished small gears and pinions are assured on these compact, fast, automatic machines.

Economy in power and space are other advantages offered in these modern gear cutters.

Any workman can produce tool room quality on a production basis with a Waltham.



Thread Milling Machine for Multiple Cutter Work

WALTHAM

Thread Millers

These remarkably productive machines are widely used because modern metal working shops appreciate the value of their high precision in thread milling.

Their versatility, too, is recognized because they produce precision threads and small worms up to two inches in diameter.

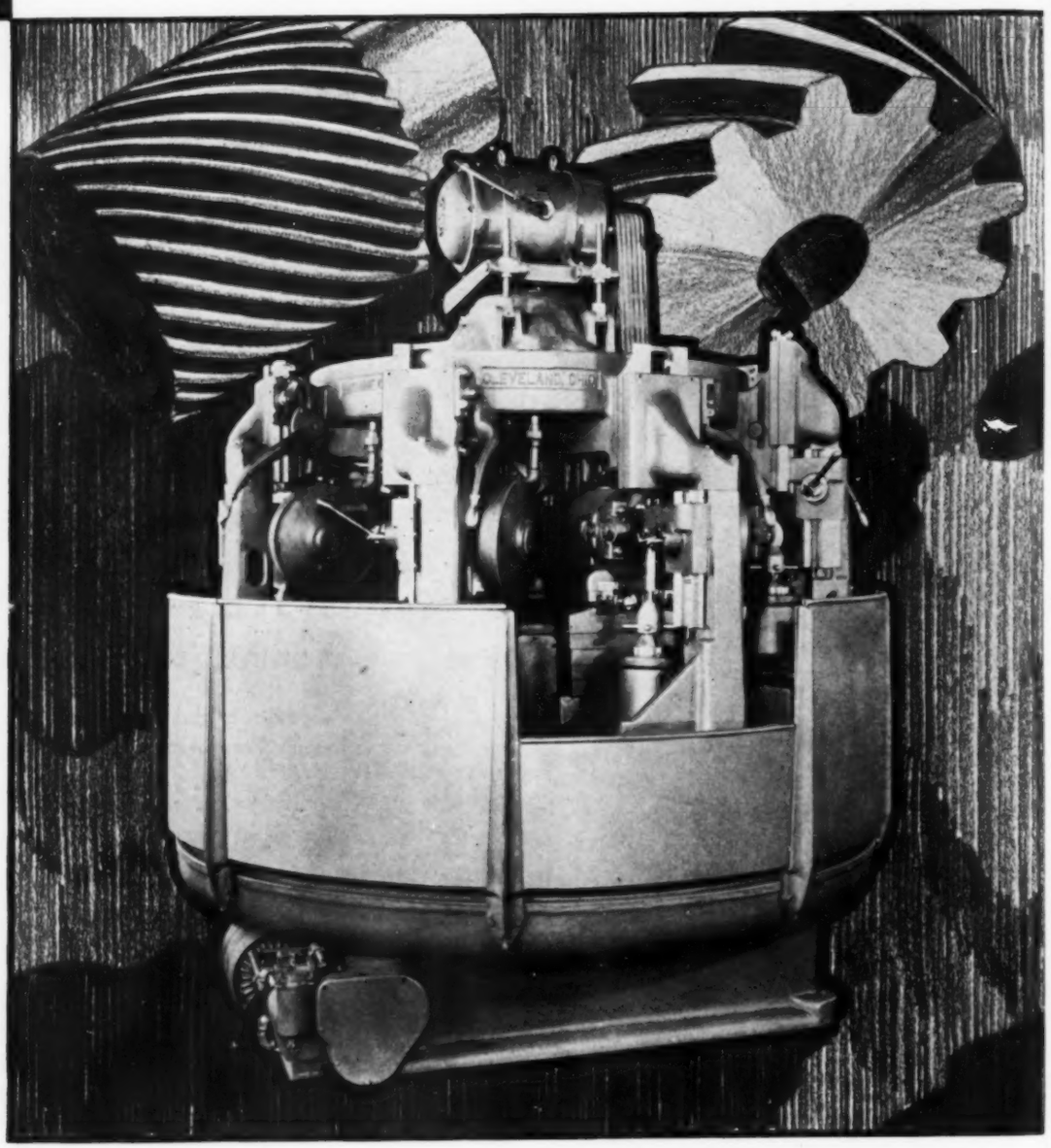
It is a simple matter to match threads already cut and turn out interchangeable parts in any quantity.

This machine can also be equipped for tool-room service, with headstock for relieved taps and hobs or for multiple cutter work.

WALTHAM MACHINE WORKS, High St., Waltham, Mass.

Three Machines that Slash

SEE THEM AT THE



MULTIPLE SPINDLE RIGIDHOBBER

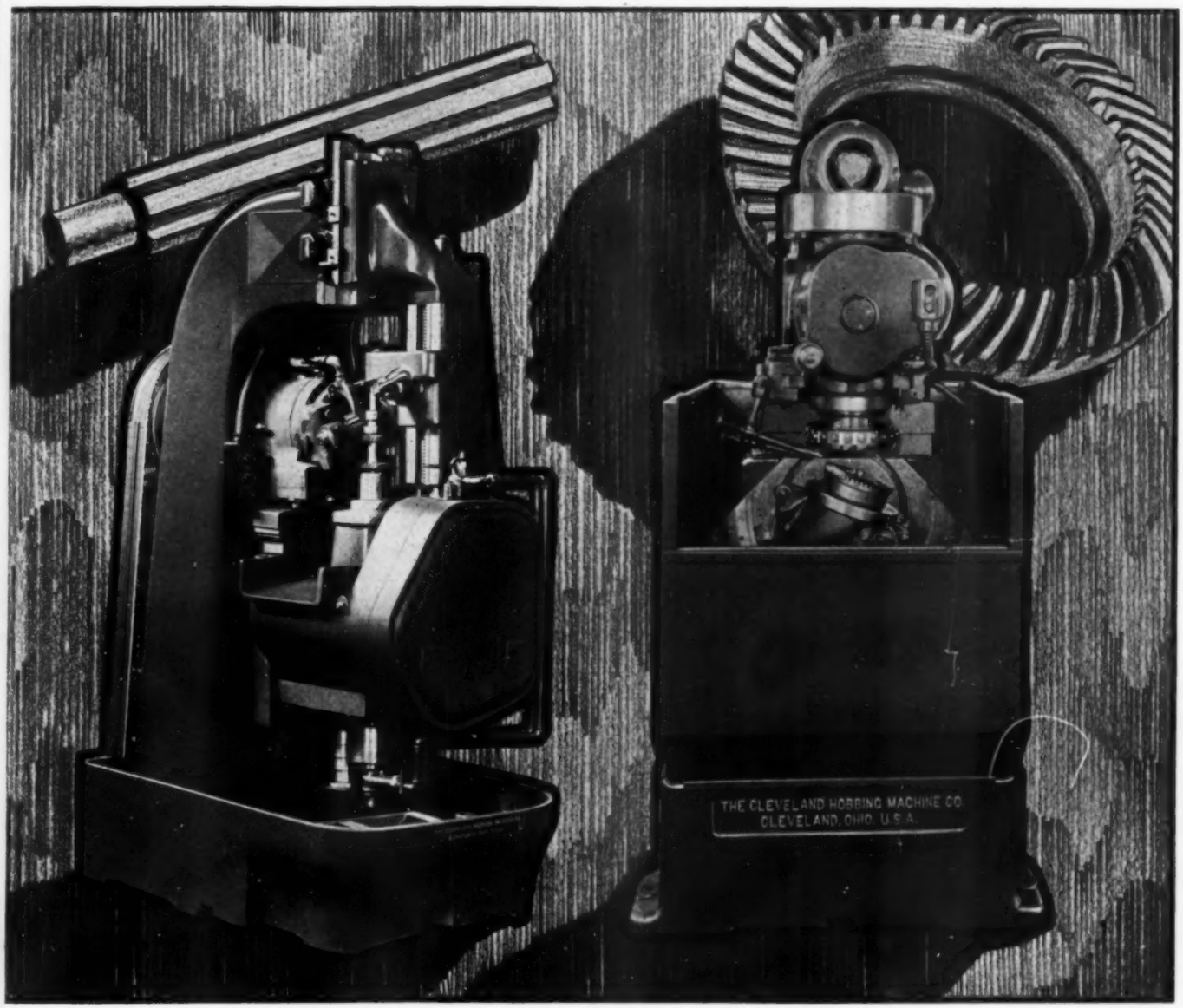
A high speed continuous production machine for the rapid hobbing of splines, spur and helical gears, etc., to a high degree of precision.

Great rigidity of construction insures general freedom from deflection. An extremely high standard of accuracy in construction—especially of indexing mechanism, and of hob and work holding fixtures assures continued precision of product.

THE CLEVELAND HOBBING MACH

Production Costs...

MACHINE TOOL SHOW . . . . . BOOTH 301



SINGLE SPINDLE RIGIDHOBBER

Produces spiral and spur gears to great precision at very low cost. Production per hour is extremely high.

The same standards of rigidity and accuracy of construction as distinguish the Multiple Spindle Rigidhobber are found in this machine.

Moving parts are minimum in number.

SPIRAL BEVEL RIGIDHOBBER

This machine applies the principle of continuous hobbing to the cutting of spiral bevel gears. Work and hob are driven in exact relationship, so the completion of the cut brings the completion of the gear—a true hobbing operation.

Costs low—production high.

INE COMPANY . . . CLEVELAND . . . OHIO . .

Once again

● The above photograph shows the oil-bath test which was one of those designed for comparison of the DAYCOIL Oil-Proof V-Belt with ordinary V-Belts. See this test machine at the Machine Tool Show and note how the DAYCOIL V-Belt in the foreground is unaffected by the oil-bath as compared to the effect of oil on the ordinary belt.

● The Dayton Rubber Manufacturing Company—the world's largest producer of V-Belts—has been the pioneer in the development and marketing of synthetic resins and allied materials. In constructing the new Daycoil casings to secure an oil-proof V-Belt hundreds of synthetic compounds were tried by our engineers. And when the final one was discovered, its absolute dependability was proved by exhaustive tests—both in our own plant and in many others. We know this Daycoil Belt is *right*.

Dayton Daycoil

Dayton pioneers!

THIS TIME WITH A LINE OF COMPLETELY

Oil-Proof V-Belts

● Now, for the first time, power transmission engineers and plant operators can forget about excessive oil as far as belts are concerned.

The Dayton Daycoil Oil-Proof V-Belt has solved the problem once and for all. And by oil-proof we don't mean that this belt will merely *resist* oil—we mean that it will run its normal life, even under unusual conditions of oil seepage, leakage or saturation. Our exhaustive tests—even with belts completely submerged in oil—have proved it.

This development means that these new Daycoil V-Belts will effect really substantial savings in belt costs in all kinds of service wherever oil is a factor.

The new Daycoil V-Belt has the same patented laminated construction principles as the famous Dayton Cog-Belt line—with the same strength and durability—flexible yet highly rigid in cross section to resist squashing. It has all of these features plus the especially designed casing of the new and exclusive synthetic rubber and synthetic resin compound, which makes it oil-proof.

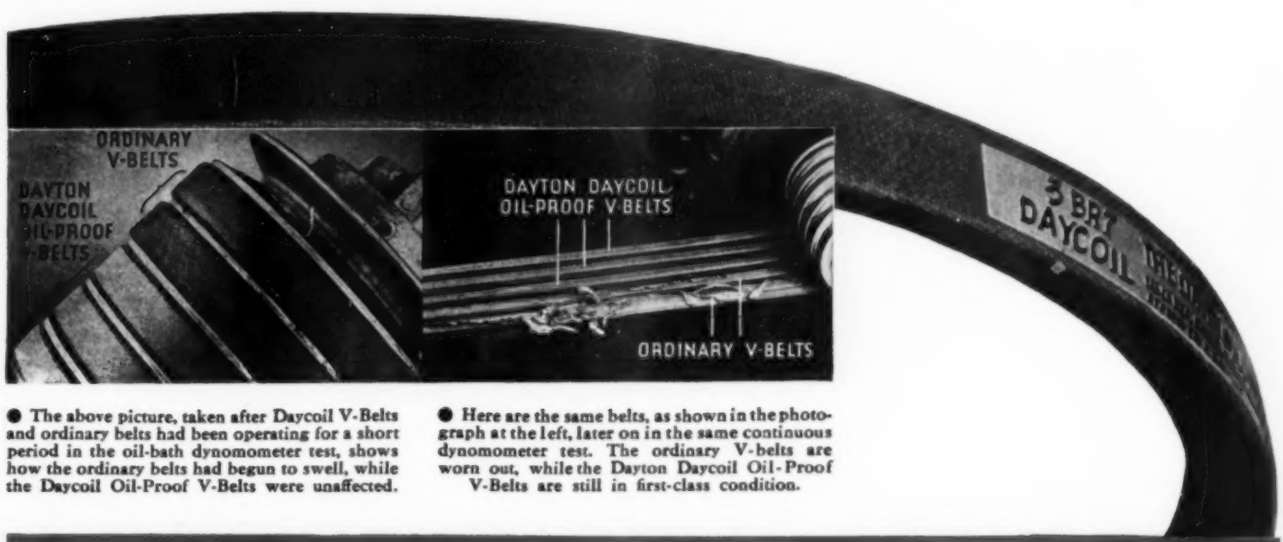
Dayton Daycoil Oil-Proof V-Belts are now available through the company's regular industrial sales and distributor organizations.

Put Dayton Daycoil V-Belts on your machines where oil is a problem. You'll be as enthusiastic about them as we are. Write us for more information.

THE DAYTON RUBBER MANUFACTURING COMPANY
DAYTON, OHIO

The World's Largest Manufacturers of V-Belts • Manufacturers also of Dayton Fan Belts, Dayton Red Tube Radiator Hose and the famous Dayton Thorobred Tires and Tubes

COG-BELT DRIVES • F.H.P. V-BELT DRIVES • V-FLAT DRIVES • COMPLETE DRIVES, PULLEYS AND BELTS IN STOCK. FRACTIONAL TO 100 H.P.



● The above picture, taken after Daycoil V-Belts and ordinary belts had been operating for a short period in the oil-bath dynomometer test, shows how the ordinary belts had begun to swell, while the Daycoil Oil-Proof V-Belts were unaffected.

● Here are the same belts, as shown in the photograph at the left, later on in the same continuous dynomometer test. The ordinary V-belts are worn out, while the Dayton Daycoil Oil-Proof V-Belts are still in first-class condition.

Oil-Proof V-Belts

Here are a few BATH PRODUCTS

to see at the CLEVELAND SHOW

—and every one a time saver . . . .

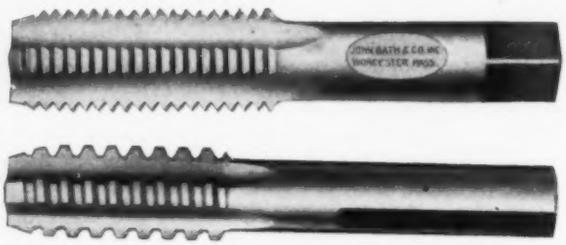
Advanced in design, proved in performance—all Bath Products are precision tools. You are cordially invited to see the Bath Exhibit of Modern Taps, Chasers, Thread Gages, Rolling Dies and Internal Micrometers at the Machine Tool Show.

These tools—built on thirty-five years experience in grinding—feature high speed steel and the Bath Process of Hardening in the Solid and Grinding Threads in the solid. There are no milling operations on Bath Taps.

Our representatives at Cleveland will gladly give you full information concerning Bath Ground Taps and specific data on the long life, high speed, accuracy, and time and labor saving of Bath Products.

Illustrated Catalog describing complete line sent on request.

BOOTH NO. A-101



GROUND THREAD TAPS

Bath offers a complete line including: Hand, Nut, Tapper, Bent Tapper, Pulley. A.S.M.E., Pipe and Special Taps of every type.

GROUND THREAD CHASERS

Bath Products include chasers for inserted blade taps; also threading tools and commercial thread grinding of various classes. Bath Chasers are ground from the solid.

BATH INTERNAL MICROMETERS AND MASTER REFERENCE RINGS

These tools measure holes to an accuracy of .0001". Bath Micrometers and Rings are available in sizes from ¾" to 8". diameter.

GROUND THREAD GAGES

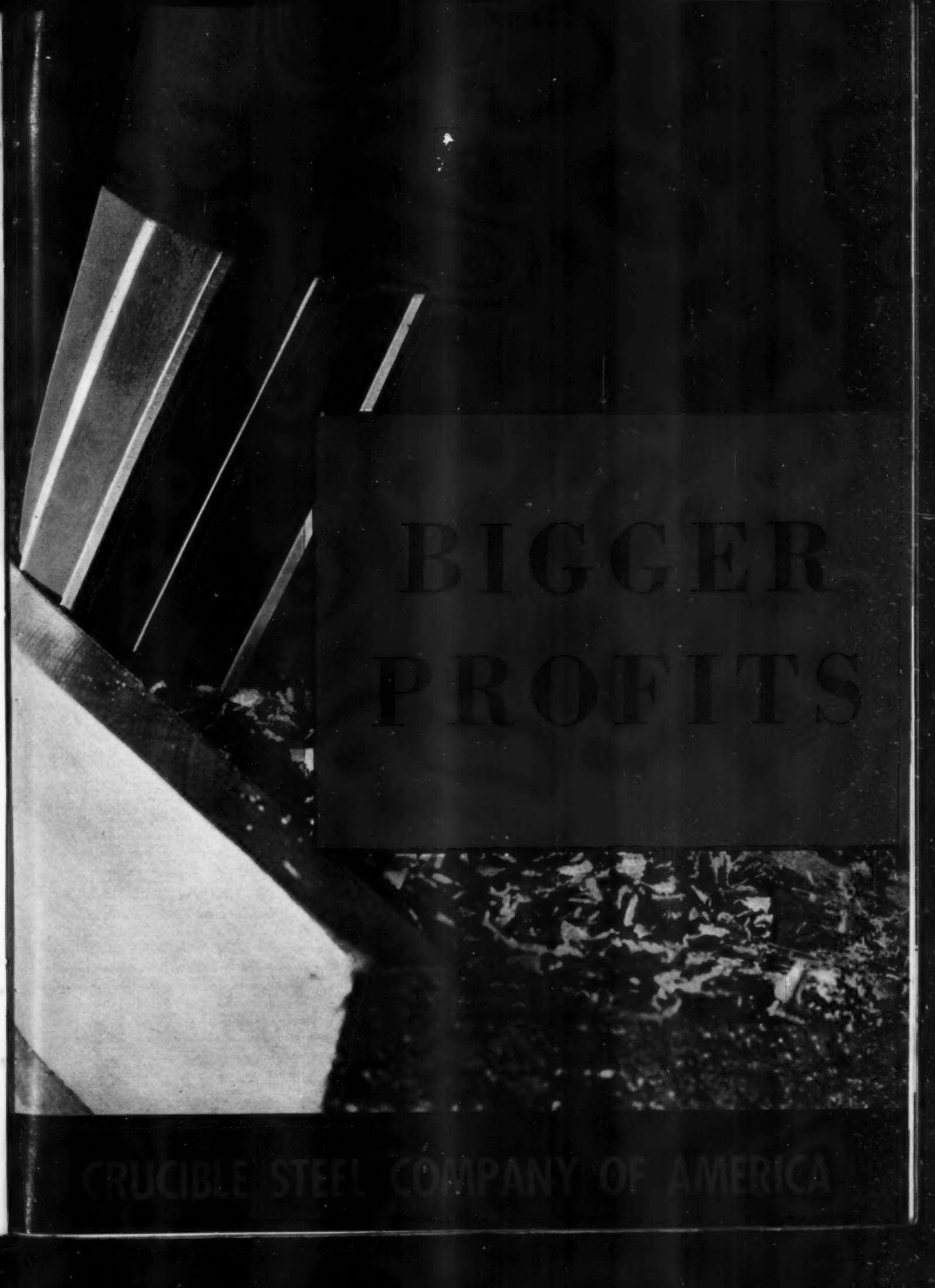
The Bath line is complete with standard and special thread gages. All Bath Gaging Members in sizes smaller than 1½" are made of high speed steel with threads "Ground from the Solid" after hardening.

John Bath & Co. Inc. Bath Trade Mark Ground from the Solid Worcester, Mass.

JOHN BATH & CO., INC.

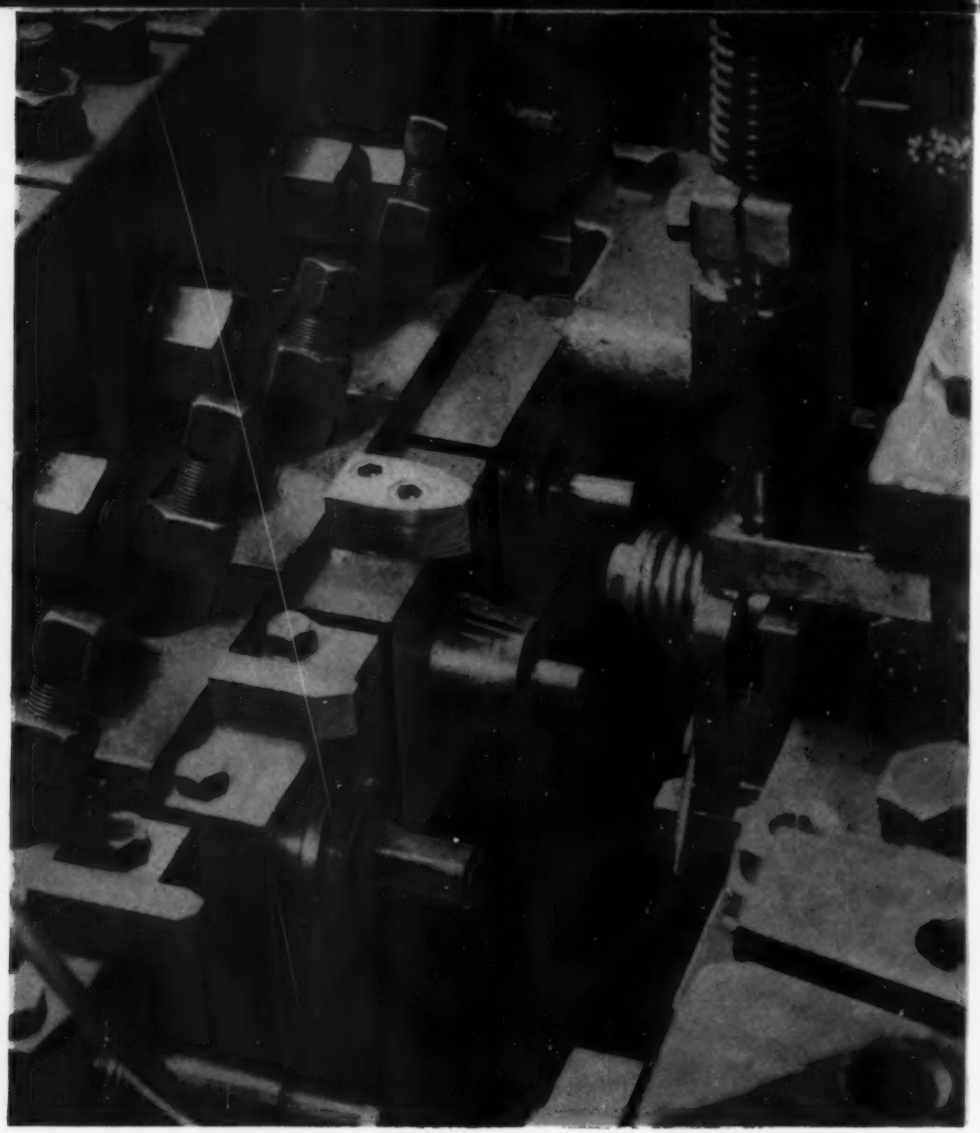
WORCESTER, MASS.

SINCE 1899


BIGGER
PROFITS
CRUCIBLE STEEL COMPANY OF AMERICA

NO OTHER TOOL STEEL IS NOW RECOMMENDED FOR USE WITH THIS MACHINE

Here Rex AA High Speed Steel turns out 80 nut blanks per minute, 100,000 to 125,000 per tool!



. . . . . WHEN PRODUCTION

YOUR metal working machines. They're as good or as bad as their "teeth"—the steel with which they are tooled. The *right* tool steel, used the *right* way, makes a big difference. Often the difference between profit and loss!

Perhaps a part of your manufacturing operations is the punching-out—under tremendous pressure—of nut blanks from round coil steel stock. You will find Rex AA High Speed Steel (OX Temper) outperforms, outlasts any other known tool steel for such work.

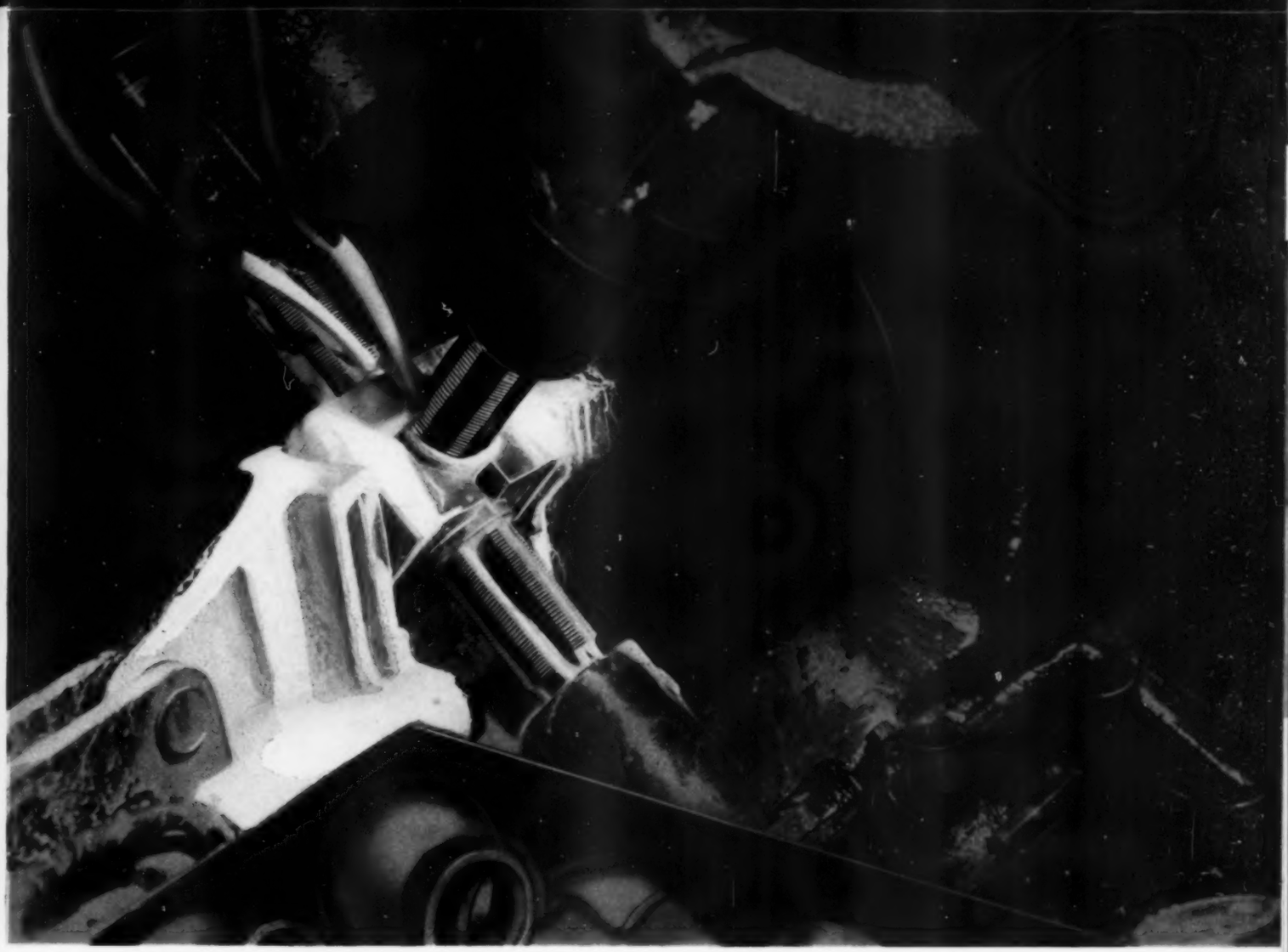
In fact, a noted metal working machine manufacturer found that Rex High Speed Steel gave a normal production of 80 nut blanks per minute, 100,000 to 125,000 per tool. *Such was the improvement over other steels that now they recommend only Rex AA for their nut blank machines.* The photograph above was taken on this job.

Or suppose you produce malleable iron fittings. You might consider runs of 10,000 to 12,000 fittings per tap good. A well-known plant did.

THE CRUCIBLE STEEL

"THEY RUN SO LONG NOW WE GET TIRED OF KEEPING RECORDS"

A well-known malleable iron fitting manufacturer steps up production from 12,000 fittings per tap to 100,000!



TEETH STAY SHARP. . . . .

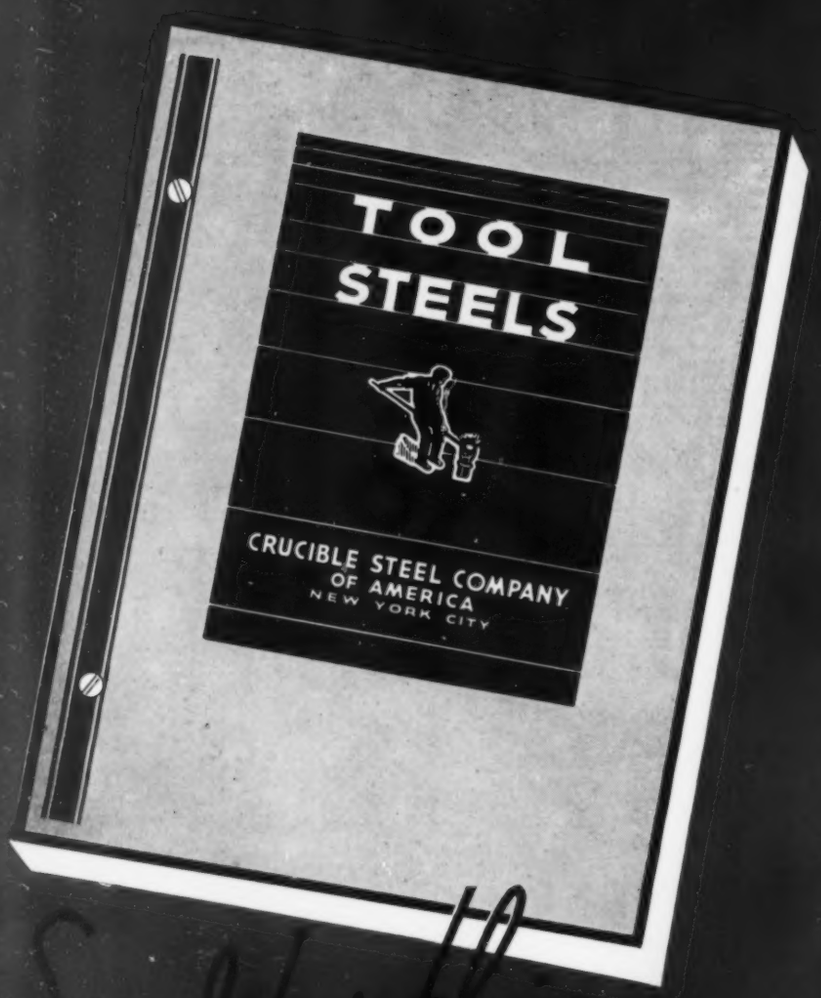
Then they changed to taps made of Rex AA High Speed Steel—heat treated and tempered *correctly*. What happened? ***Production leaped 80,000 to 100,000 fittings per tap!*** The photograph at the right was taken at the plant of this manufacturer.

Comparable Results in YOUR Plant?

Certainly! If you, too, use the *right* tool steel, *correctly* heat treated and tempered for each specific machine job. Whatever your work, there's one tool steel that gives the *best* results . . . turns out the work cleaner, faster, in longer runs.

But how select that one correct tool steel from the many types and grades on the market? The Crucible Steel Company has now simplified this difficult problem . . . made your correct choice easy, certain. On the next page you will find a way which may prove invaluable to the more efficient, the more profitable operation of your metal working machines.

COMPANY OF AMERICA



Send for this NEW Book

... they can choose the one right tool steel for ... special job. . . . It contains ... other ... specific tabulated data and recommended tool steel for every conceivable application.

You cannot afford to be without this new book in your shop. It speaks your language. It was written with your specific tool steel problems in mind.

The result of the close cooperation of Crucible Steel Company metallurgists and trained engineers, this new book draws upon the many years of highly specialized experience of these men—men responsible for practically *all* real advances in tool steel development during the past years.

In this new book, the usual applications and special qualities of each type and brand of tool steel are pointed out. Authoritative information regarding the annealing, heat treatment, and tempering of these steels is completely presented. The Crucible Steel Company of America, 405 Lexington Avenue, 42nd Street, New York City.

Among others, these leading brands are produced by THE CRUCIBLE STEEL COMPANY

REX AA

The original 18-4-1 High Speed Steel with unvarying uniformity. Years of dependable service. An outstanding grade for the majority of cutting tool steel requirements. Now available in five "tempers" with varying carbon content.

REX AAA

A Cobalt High Speed Steel with even greater resistance to wear than REX AA, and a higher degree of red hardness.

REX 95

Possesses much greater toughness and hardens at a lower temperature than most Cobalt high speed steels.

SANDERSON DOUBLE SPECIAL

A carbon-tungsten alloy with remarkable hardness and wear resisting qualities, ideal for fast finishing operations.

HYCC—AIRDIE

Oil and air-hardening high-carbon high-chromium die steels, constantly setting new production records because of their great resistance to abrasive wear.

PARAGON

An oil-hardening non-deforming alloy tool steel for use on tough jobs where volume change cannot be tolerated and where large production must be served.

PEERLESS "A"

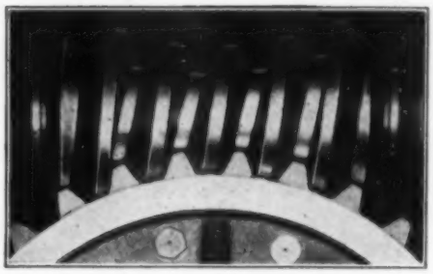
The peer of all hot work steels processing exceptional red hardness for difficult hot work jobs.

SANDERSON SPECIAL TOOL STEEL

Highest quality Carbon Tool Steel. A deep hardening, water-hardening steel widely used for many production tools.

For Unusual Production Problems, the Personal Services of Our Engineers and Metallurgists are Yours . . . at absolutely no charge or the slightest obligation.

CONE AREA-CONTACT WORM GEARS NOW ON PRODUCTION BASIS



Now that complete and practical solutions of the cutting problems involved in the production of Cone Area-Contact Worm Gears have been reached, the amazing advantages of this ideal type of gear are available for wide application in industry.

The Cone Worm Gear, so named after its inventor, Samuel I. Cone, realizes in practice a principle long recognized as possessing important advantages, yet for many years impossible of production in quantity because no rational cutting method or practical tool equipment had been developed.

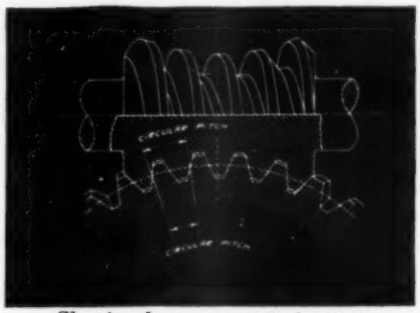
Continuous area contact over the full depth of the several meshing teeth has been achieved for the first time in the Cone Worm Gear, resulting in a long train of operating advantages.

Line contact the full depth of teeth, as compared to point contact

Cone Worm Gears afford 30 times as much tooth area contact at a given time as the ordinary straight line type. The consequent distribution of pressure results in less wear, less heat generation, ideal lubrication, greater smoothness and silence, and a proved efficiency as high as 99.34%—the highest ever recorded.

Besides having the highest load-carrying capacity of any worm gear of a given size, Cone Area-Contact Worm Gearing in operation naturally provides a cushioning oil film. It wears in, instead of "wearing out," is free from pitting and operates at a lower cost per horse power transmitted than any other known worm gearing.

Furthermore, this gearing possesses a wider range of applications



Showing how area contact occurs simultaneously between worm flanks and all meshing wheel teeth

—continuous operation at 30,000 r.p.m.—intermittent operation at four revolutions per hour under extreme loads—gear ratios as high as 100 to 1 and as low as 1 to 1—are examples of standard conditions under which Cone Worm Gearing is operating.

The whole secret of the success of the Cone Area-Contact Worm Gear lies in the practicability of the method and the means by which it is manufactured: Automatic generation of both worm and wheel blanks without cutting away stock essential to the finished tooth form.

Production

Corner of Michigan Tool Company plant showing several types of Cone Area-Contact Worm Gears in production

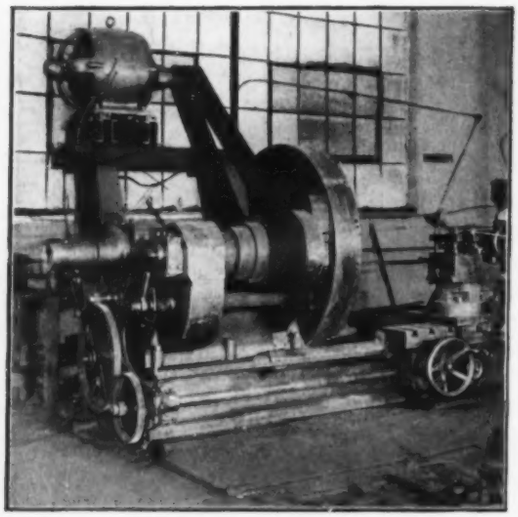
With the solution of the apparently simple, but exceedingly intricate production riddle represented by Cone Area-Contact Worm Gearing, cutting tools and machines for both large and small scale production covering the complete range of sizes, gear ratios and capacities have been developed. This machinery is available for manufacturers who choose to set up their own production and is also installed as standard equipment for manufacture of gears by the Michigan Tool Company to supply customers' requirements.

Complete information covering technical data on Cone Area-Contact Worm Gears, as well as details relating to production, operation and applicability, will be gladly supplied in response to inquiry.

MICHIGAN TOOL COMPANY
DETROIT, MICHIGAN

RHOADS TANNATE LEATHER BELTING

For Metal Workers



Taking a $\frac{1}{4}$-in. cut for THIRTEEN years . . . Still on the job

FEW drives are more exacting than this one—a short center, heavy duty lathe, taking heavy cuts at low speed. The lathe is used almost constantly, turning down heavy castings. The Tannate Belt was installed in 1922, and is still in good condition. The superintendent thinks the motor has not been moved back more than 2 inches during the past two years.

Longer life on hard drives, slight stretch and extra strong grip, together with superior resistance to steam, gases, acid fumes and oil make Tannate Leather Belting one of the most economical power transmitting mediums; as many buyers have proved.

It has increased output and saved trouble in many plants.

J. E. RHOADS & SONS

PHILADELPHIA, 35 N. SIXTH ST.
NEW YORK, CHICAGO, ATLANTA
CLEVELAND, WILMINGTON, DEL.

ALL INDUSTRY DEPENDS ON *Mac-its*

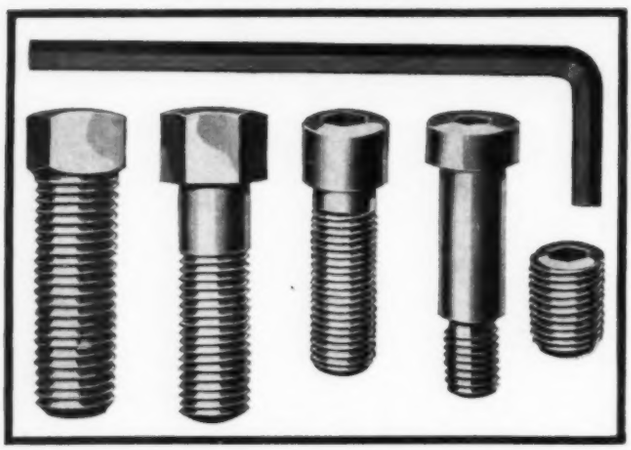
PRONOUNCED "MACK-ITS"

. . . . FOR DURABILITY!

For a quarter of a century, Mac-its have been built to an inflexible standard of strength. That was the original Mac-it idea—Strength; and explains why Mac-it Screws are more *durable*.

The *durability* of Mac-*its* means screws that won't break, even when forced beyond reasonable limits; . . . hollow and socket screws that won't ream out . . . set screws that won't shear nor mushroom at the points . . . screw products that have in them the stuff that it takes to make them *last!*

Write for "The Mac-it test".



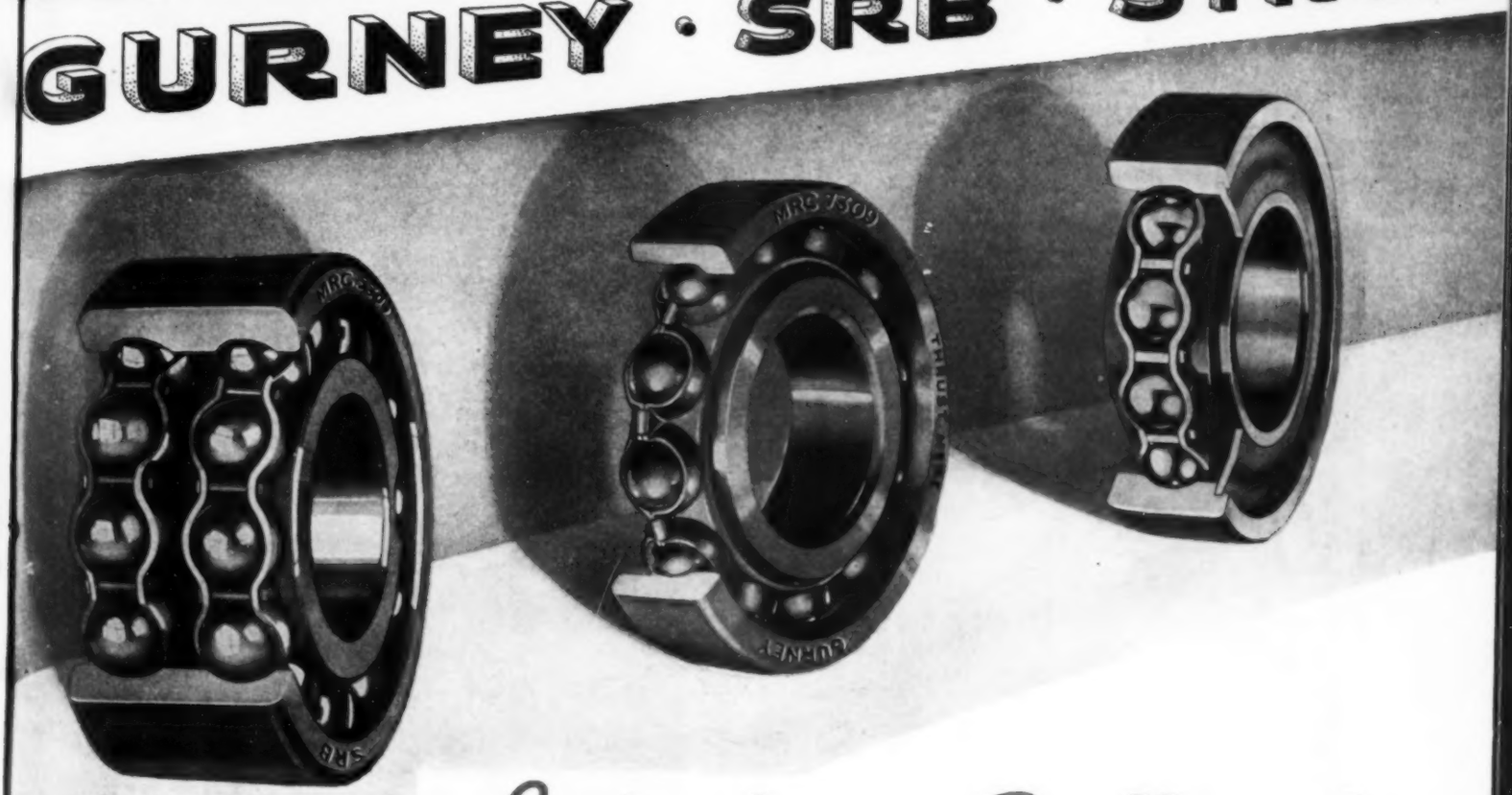
Representative members of the Mac-it family reading from left to right: Square Head Set, Hex Head Cap, Socket Head Cap, Socket Head Stripper Bolt, Hollow Set; and (at the top) Mac-it Long Wrench.

THE STRONG-CARLISLE *and* HAMMOND CO.

CLEVELAND, OHIO . . . NATIONAL DISTRIBUTORS

M-R-C

GURNEY · SRB · STROM



Leadership . . . On Parade

THE Marlin-Rockwell exhibit at the National Machine Tool Show will include all recent ball bearing developments that have made possible the high speeds and precision workmanship of modern machine tools. Outstanding spindle applications will be shown featuring such bearings as the M-R-C Super-Precision operating at spindle speeds as high as 50,000 r.p.m. and the M-R-C Duplex that makes possible the enormous preloads necessary for maximum rigidity in heavy duty service. In fact, examples of many types of successful spindles will be available for close study and discussion. Be sure, therefore, to review this M-R-C Leadership line—on parade at Cleveland.

M-R-C Strom SRB Gurney Ball Bearings

MARLIN-ROCKWELL CORPORATION

Executive Office—JAMESTOWN, N. Y.

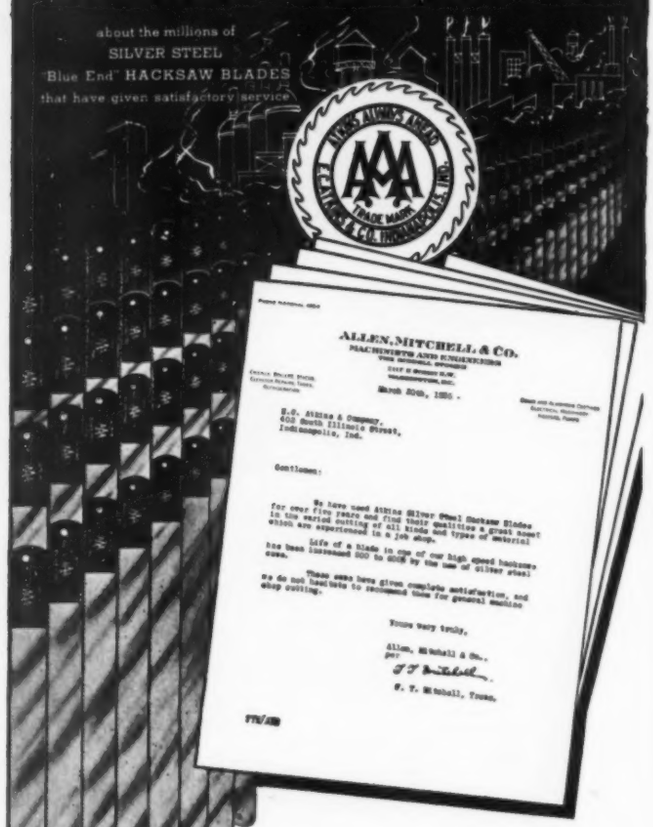
Factories: Jamestown — Plainville, Conn. — Chicago

Booth E-200—Machine Tool Show—Cleveland

M-R-C BALL BEARINGS

THEY'RE TELLING YOU

about the millions of
SILVER STEEL
"Blue End" HACKSAW BLADES
that have given satisfactory service



500 to 600% Increase

by using

ATKINS
SILVER STEEL HACKSAWS

Allen, Mitchell & Co., Machinists and Engineers, Washington, D. C. say in the above letter—"The life of a blade in one of our high speed hacksaws has been increased 500 to 600% by the use of SILVER STEEL saws"!

Hacksaw users everywhere are getting more out of their hacksaw dollar by the use of "Blue End" Blades.

Buy them through your Distributor

E. C. ATKINS AND COMPANY
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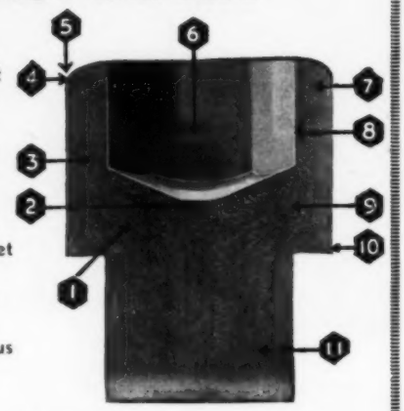
BRANCHES ATLANTA, GA. MEMPHIS, TENN. NEW ORLEANS, LA. PORTLAND, ORE. SEATTLE, WASH. CHICAGO, ILL. NEW YORK, N. Y. KLAMATH FALLS, ORE. SAN FRANCISCO, CALIF. PARIS, FRANCE

FIBRO FORGED
TRADE MARK
Socket Screws

1 Increased Strength
2 Core Fibres, Uncut
3 Continuous Fibres
4 No Tool Marks
5 Concentric, Head and Body
6 Improved Socket
7 Continuous Fibres
8 Re-enforced Socket Wall
9 Continuous Fibres
10 Square Shoulders
11 Original Continuous Fibres.



Patented by **HOLO-KROME**

HOLO-KROME FIBRO FORGED TRADE MARK SCREWS

Make your own test of these new screws. State how many and size. DEPT. "A" will send them to you FREE.

HOLO-KROME SCREW CORP. Bristol, Conn. U. S. A.

DISTRIBUTORS:
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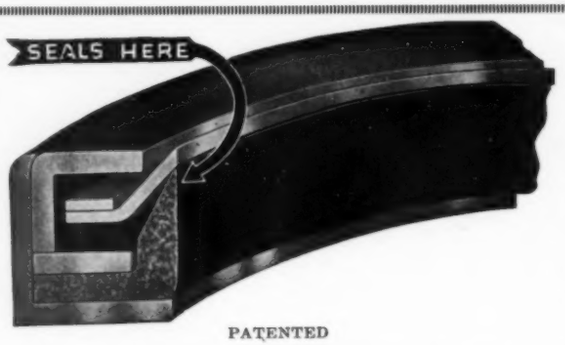


PATENTED

Gits Precision Oil Seal
Construction Exclusive Feature

Note the improved form of flexible leather washer which prevents the leakage of oil from the housing.

The leather washer is tapered where the pressure of the flat spring clamping ring is applied.

The flexibility of the tapered leather requires but a slight pressure to be contracted and effectively seal with minimum friction on shaft.

The sharp edge of the tapered washer shears the oil film preventing escape of oil.

Catalog No. 50 Just off the Press. Send for Your Copy.

GITS BROS. MFG. CO.
1857 S. Kilbourn Avenue - - - Chicago, Ill.

FAFNIR...*an important bearing*

..*on* Machine Efficiency

Motion and machines are linked inseparably. When motion is to perform useful work in an efficient manner, while maintaining predetermined standards of accuracy, one feature of design has the unanimous support of the machine tool industry—ball bearings at all vital points.

In keeping abreast of the specific demands which higher rates of speed and greater accuracy of machining impose, Fafnir has developed a line of bearings which truthfully can be described as "the most complete line of ball bearings in America." But, more than this ability to supply the exact type and size for every application, Fafnir builds to such exacting standards that perfect duplication of enduring, friction-free support is always assured.

Duplex, pre-loaded, grease-shield, felt-seal —name any type of bearing for any service and you will find a Fafnir that has proved its outstanding quality through years of service. And bear in mind that Fafnir's machine tool specialists—experts in divorcing friction and wear from motion—place their years of practical experience at your disposal. THE FAFNIR BEARING COMPANY, *New Britain, Connecticut.*

Atlanta . . . Chicago . . . Cleveland . . . Dallas . . . Detroit . . . Milwaukee . . . Minneapolis . . . New York . . . Philadelphia.

Keep abreast of new developments. Read Fafnir's house organ, "The Dragon." We will gladly put you on the mailing list.

FAFNIR Ball Bearings

"The Most Complete Line of Ball Bearings in America"

here they are . . .

the NEW CJB PILLOW BLOCKS

. . . with 9 big Advantages

1 Supplied in Unit Type (light, normal, and medium duty) and Ball and Socket Type (Standard and heavy duty) thus providing two distinct types which permit a selection of nine capacities for a given shaft size (inch dimension) and four additional capacities for each standard metric shaft diameter.

2 All types are fitted with felt seals to prevent entrance of foreign matter and to retain lubricant. In addition the Medium and Heavy Duty Types are equipped with a labyrinth closure necessitating no added cost for flingers or special closures.

3 The Standard and Heavy Types are made with a ball and socket type of housing which permits the installation of a heavy duty rigid type double row ball bearing and includes features which compensate for variations in the alignment of base and shafting.

4 The Standard and Heavy Types also employ a patented method of drawing the bearing onto the adapter. Easily located and fixed to the shaft without opening Pillow Block. Cannot overload bearing by reason of too much take-up, yet due to wrapping action of adapter around shaft, the possibility of slippage is eliminated. The adapter, being of one-piece special construction, permits the use of oil for lubrication, which is very desirable at high speeds without loss of lubricant.

5 The Medium Duty Straight Bore Type, No. 92000 Series, provides for mounting directly on the shaft. This is recognized as the superior method if shafting is held to close tolerances. This Type can be supplied in either inch or metric bores.

6 Both Medium and Heavy Duty Types employ a patented locking device for fixing the end cap without the use of threads; therefore the direction of shaft rotation is optional.

7 The Medium Duty Type, when employed for exacting applications, utilizes a countersunk shaft, using the drilled holes as a drill bushing. The collar is then rotated 90 degrees and the set screws placed in position. The offsetting of the drilled and tapered holes provides an internal pressure against the inner ring, thus locking it securely to the shaft.

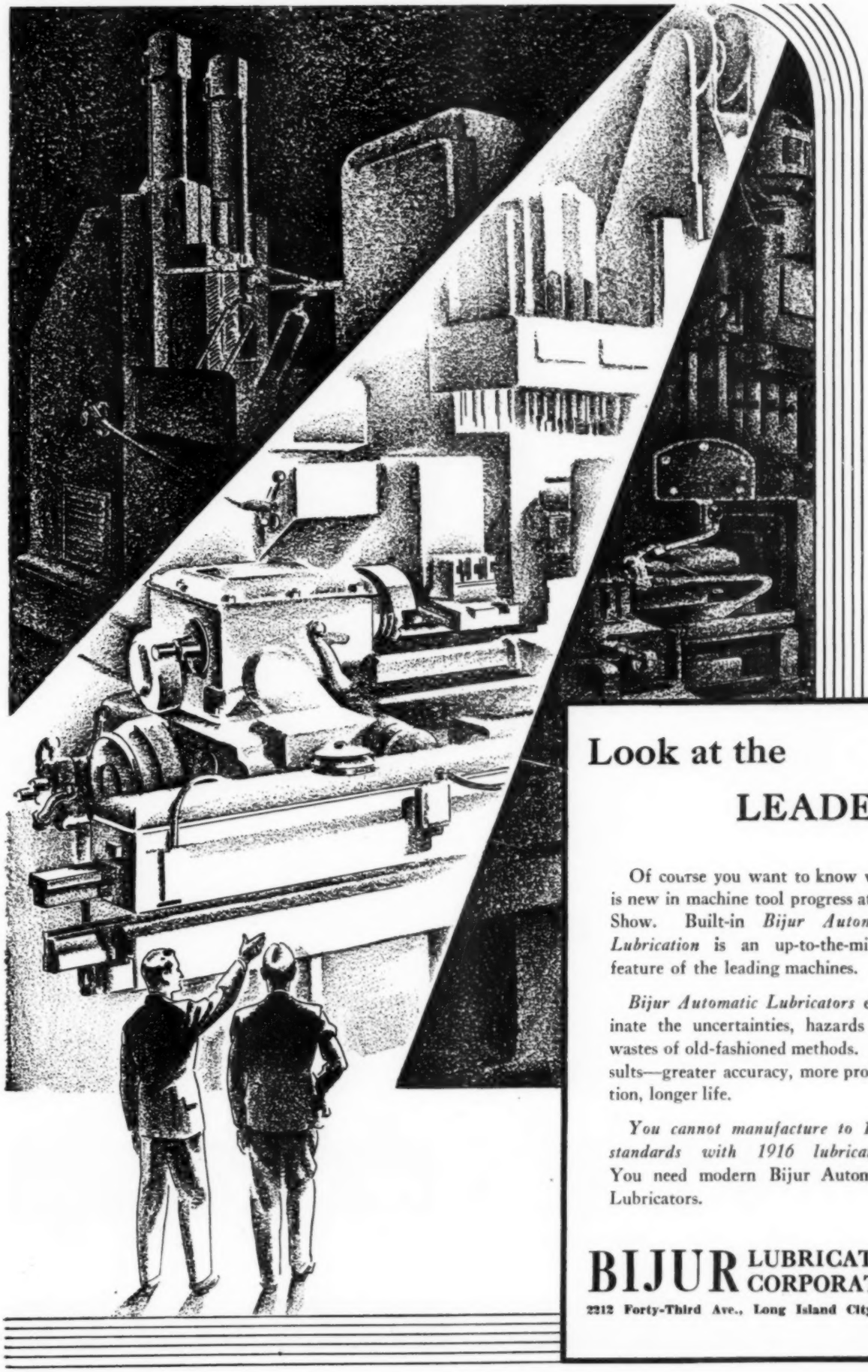
8 The Heavy Duty Tapered Bore Type is designed for mounting on standard shafting and compensates for a normal amount of variation in tolerances.

9 Aside from their mechanical perfection these new Pillow Blocks are noteworthy examples of modern machine design in which appearance and ruggedness have been combined in a most pleasing effect. Units are finished in silver grey with red trim.

THE Ahlberg Bearing Company with its firmly established reputation for bearing quality and dependability now presents a new and remarkable line of Pillow Blocks designed to meet an unusually wide range of applications and embodying the most noteworthy improvements in the last 20 years.

Ahlberg, fully aware that anti-friction bearings, being precision products, must be properly housed in order to render maximum benefits, has concentrated its entire experience and engineering skill on this latest development. Every aim and expectation has been more than realized in the result and a study of the new and unique features listed at the left will offer convincing reasons for their superiority and why they will add better performance, greater sales value and a more pleasing "eye-appeal" to any product requiring pillow blocks. Write for temporary engineering data or see them at Booth E—301, Machine Tool Show.

AHLBERG BEARING CO.
400 EAST 29th STREET, CHICAGO



Look at the LEADERS

Of course you want to know what is new in machine tool progress at the Show. Built-in *Bijur Automatic Lubrication* is an up-to-the-minute feature of the leading machines.

Bijur Automatic Lubricators eliminate the uncertainties, hazards and wastes of old-fashioned methods. Results—greater accuracy, more production, longer life.

You cannot manufacture to 1936 standards with 1916 lubrication. You need modern Bijur Automatic Lubricators.

BIJUR LUBRICATING CORPORATION

2212 Forty-Third Ave., Long Island City, N. Y.

PRECISION BEARINGS

In 108 Distinct Series

•

TO machine tool and machinery builders, NORMA-HOFFMANN offers the most complete and comprehensive line of anti-friction bearings in America—and every one a true PRECISION unit.

There are 108 distinct series in the NORMA-HOFFMANN line—a PRECISION Bearing for every load, speed and duty.

Many of these have been pioneered, or specially developed, by NORMA-HOFFMANN engineers to meet specific requirements as revealed by advancing methods in machine design, manufacture and operation.

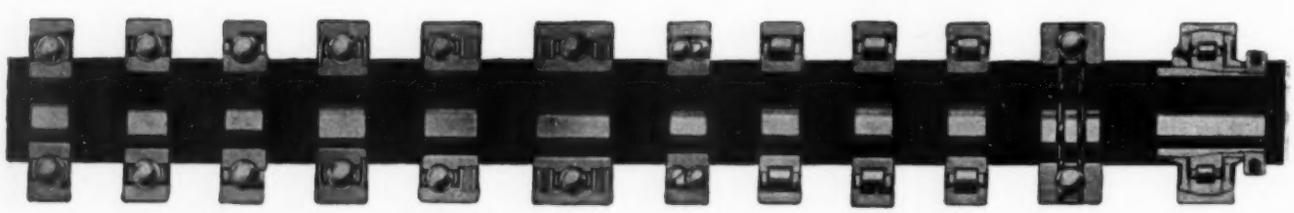
In times past, machine builders often had to adapt their designs to employ the comparatively few standard types of bearings then available.

Today—with the wide range of types and sizes afforded by the standard NORMA-HOFFMANN PRECISION line, such compromise is seldom necessary.

In the 108 PRECISION Series are included: ball, roller, needle, and thrust bearings; open, closed, and angular contact bearings; radial and self-aligning types; single and double row radial types; felt-protected, shielded, snap ring and self-sealed types. The size range is from ⅛" to 21" bore, embracing both metric and inch sizes. PRECISION Ball and Roller Bearing Pillow Blocks are also available in an extensive range of sizes.

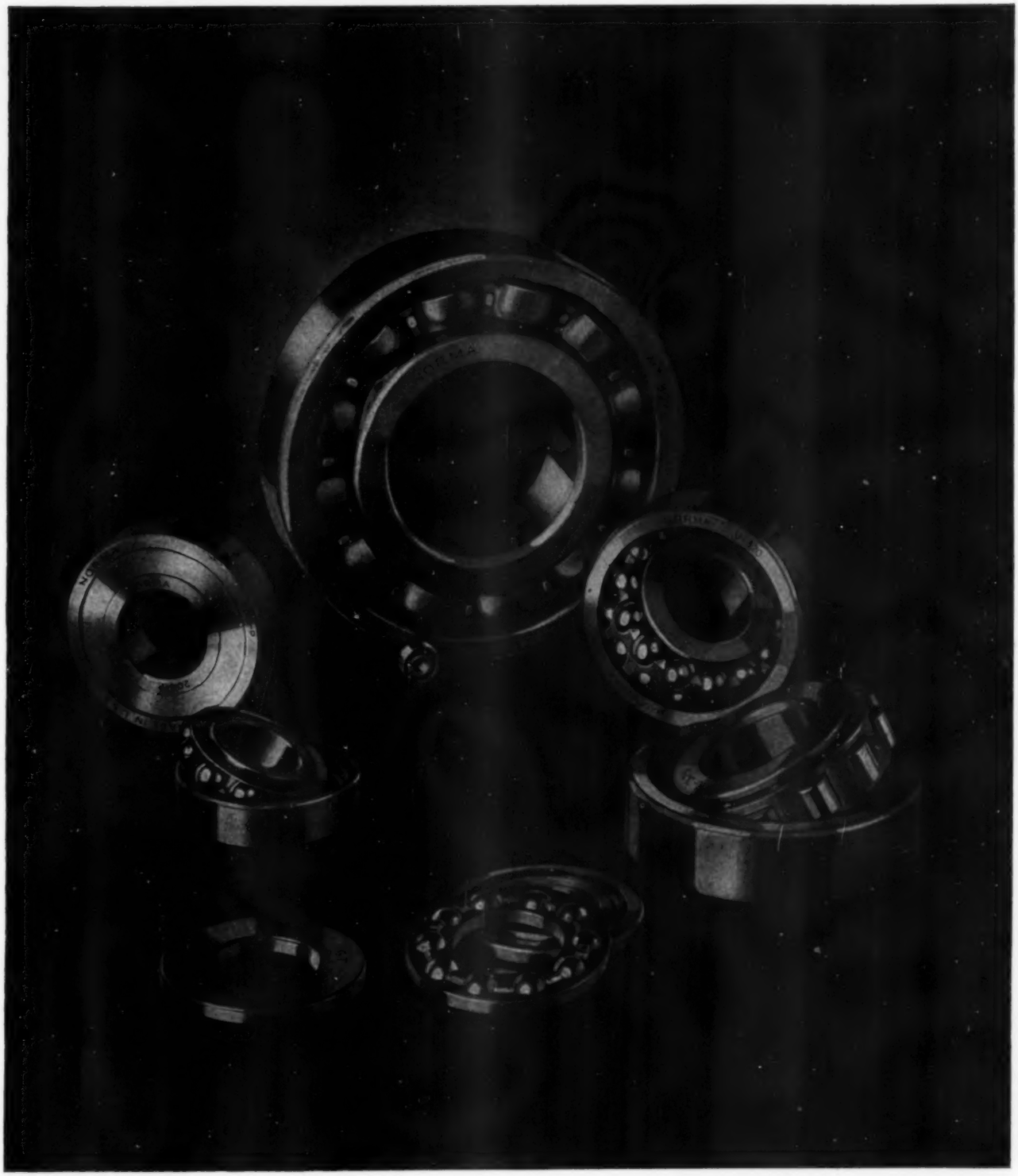
, , ,

See the NORMA-HOFFMANN display of PRECISION Bearings at Booth A-401, National Machine Tool Exposition. Discuss your bearing problems with our engineers—without obligation. Secure the latest PRECISION BEARING Catalog.



NORMA—HOFFMANN BEARINGS

A-3127



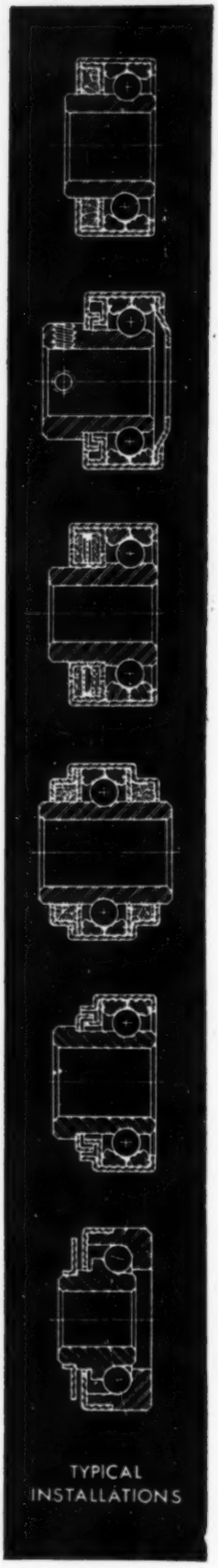
Write for the Catalog
of PRECISION Bearings

Let our Engineers work
with yours . . . .

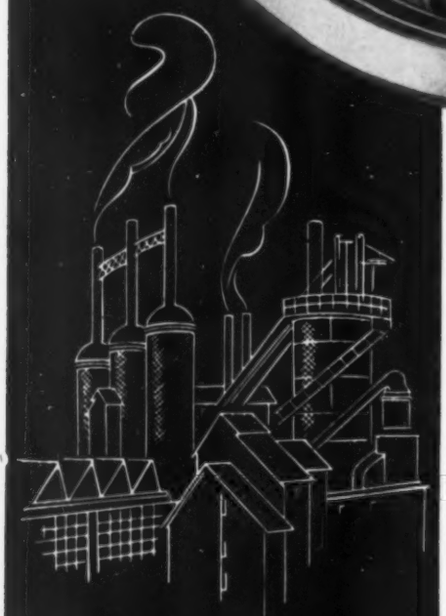
"NORMA-HOFFMANN"
PRECISION BEARINGS
BALL, ROLLER AND THRUST

CORPORATION, STAMFORD, CONN., U.S.A.

LESS COST-HIGHER EFFICIENCY-SPEEDS UP TO 2500 R·P·M-EVERY SIZE
ALL TYPES OF INSTALLATION-MADE TO YOUR OWN SPECIFICATIONS



TYPICAL INSTALLATIONS



"COMMERCIAL" BALL BEARINGS meet the constantly increasing demand for good bearings at a moderate price. "COMMERCIALS" are obtainable in all standard sizes—large or small quantities.

Also, special installations, made to your own specifications. These bearings are used in all industries and for all purposes. They reduce bearing costs and give better service.

THE SCHATZ MANUFACTURING CO.
POUGHKEEPSIE, N. Y.
Detroit Sales Office: 2608 Book Tower.
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"Commercial" ANNULAR BALL BEARINGS

55 EXHIBITORS AT THE MACHINE TOOL SHOW ARE USERS OF TWIN DISC CLUTCHES

And here are some of their reasons —"Best fulfills space and power capacity requirements." "Extremely positive, quick acting." "Simple and positive locked adjustment." "Takes a heavier load." "Fast flexible operation." "Unusual reserve capacity to withstand abnormal usage." "Ease of assembly." "For easier control and operation, which ensures not only speedier but greater production." "We could buy them cheaper than we could build them."

Write for specific recommendations. Engineering data on request. *Twin Disc Clutch Company, 1334 Racine Street, Racine, Wisconsin.*

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Acme Machine Tool Co., The
Allis-Chalmers Manufacturing Co.
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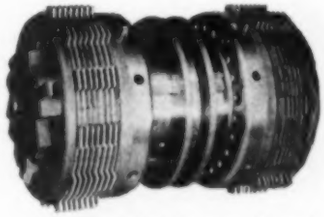
Close Coupled Single Clutch



Close Coupled Duplex Clutch

TWIN DISC CLUTCHES

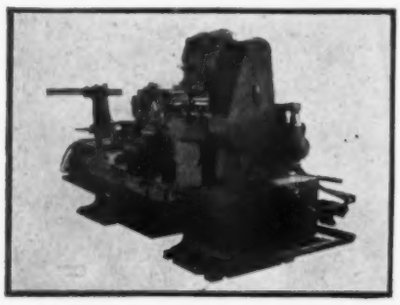
MACHINE TOOLS GO MODERN WITH CHAIN DRIVES

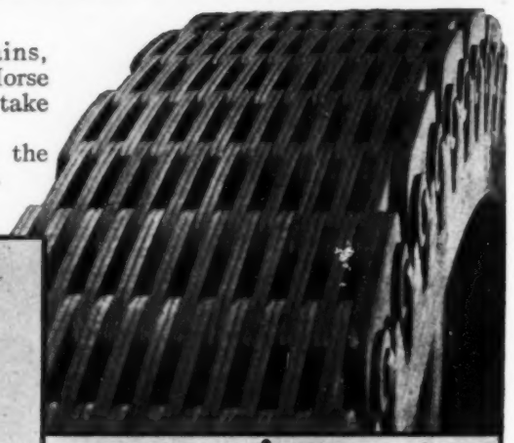
At the Machine Tool Show (and surely you will be there) you'll quickly realize the preference Machine Tool Manufacturers have for chain drives. Although proved in use over a period of many years, this type of transmission is really the modern drive. No other drives have been discovered that are as reliable, positive, efficient and long-lived as silent or roller chain drives.

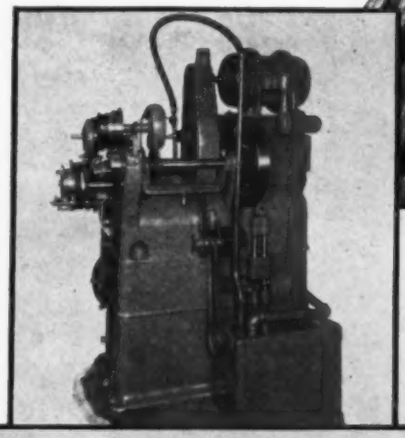
Modernization—the topic of the show, can well begin with a thorough consideration of power transmission in your own plant, as well as on the tools you make. Increased production at lower costs—the real result of modernization, has come from a study of this production factor.

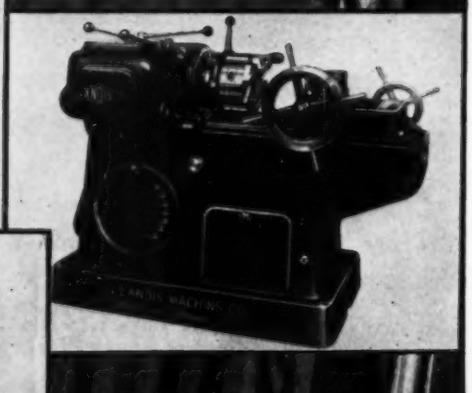
You'll find it worth your while to visit the Morse Chain Exhibit at the show—Morse, as you know, is one of the largest manufacturers of silent chains, roller chains, couplings, and clutches. Morse engineers will be on the job to take good care of you.

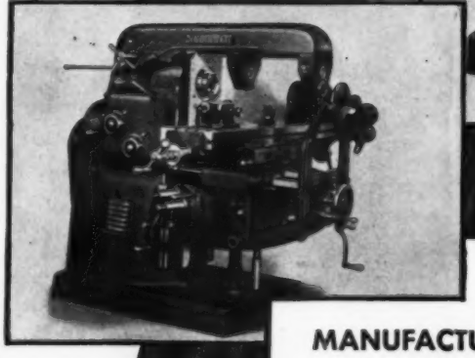
But, by all means, visit the Machine Tool Show at Cleveland.

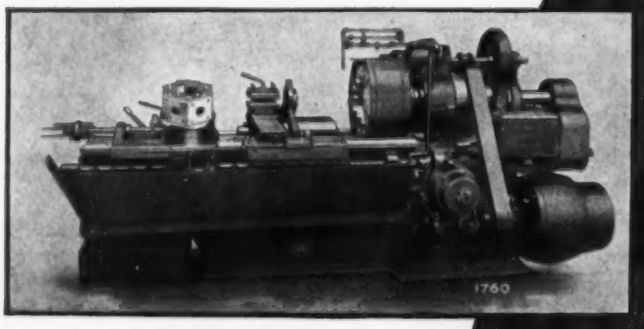












LEADING MACHINE TOOL MANUFACTURERS USE MORSE SILENT AND ROLLER CHAINS

Abrasive Machine Tool Co.
Acme Machine Tool Co.
American Tool Works
Avery Drilling Machine Co.
Barber Coleman Machine Co.
W. F. & John Barnes Co.
Barrett Machine Tool Co.
Bradford Machine Tool Co.
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Carlton Machine Tool Co.
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Consolidated Machine Tool Corp.
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Jones & Lamson Machine Co.
Landis Tool Co.
Landis Machine Co.
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National Acme Co.
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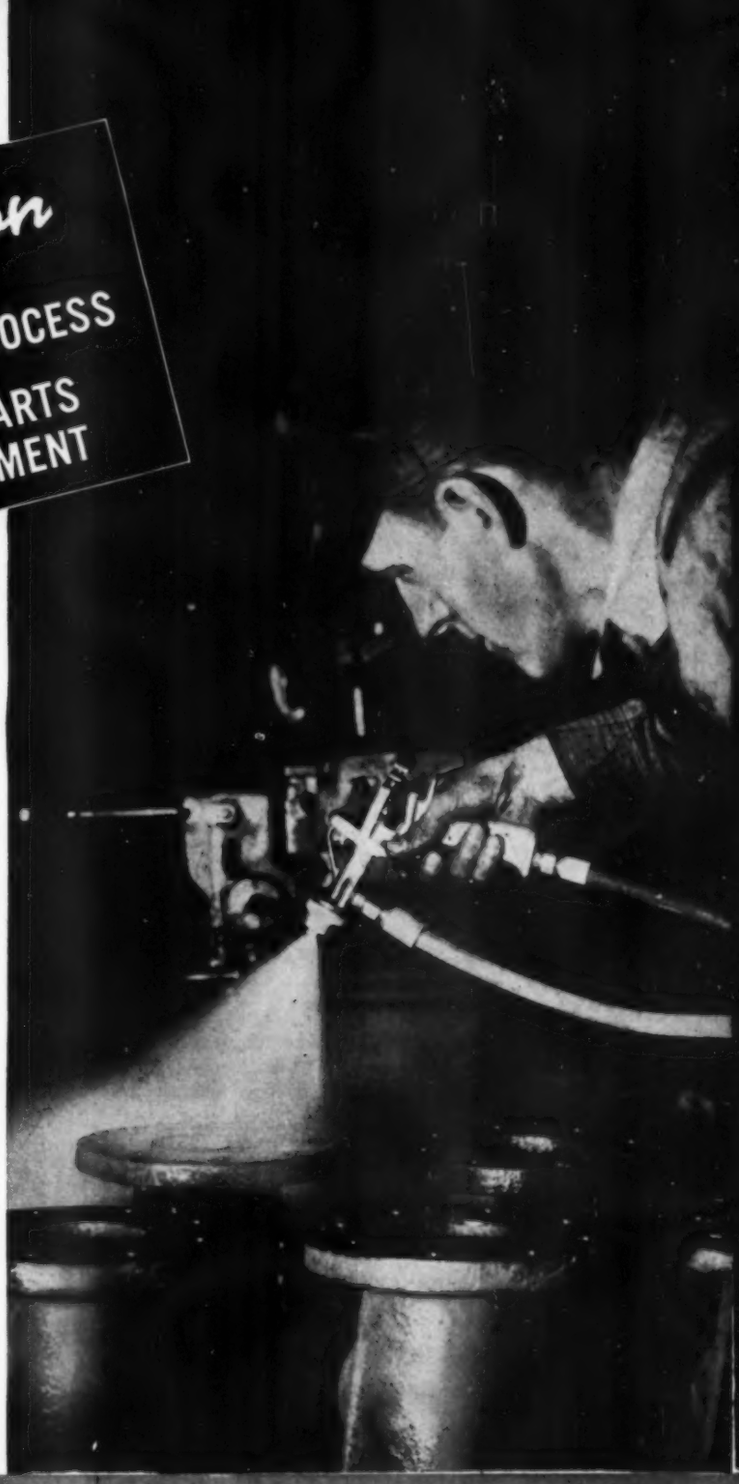
Norton Company
Rockford Drilling Machine Co.
Rockford Machine Tool Co.
Warner & Swasey Co.

MORSE CHAIN COMPANY, ITHACA, N. Y.

DIVISION OF BORG-WARNER CORPORATION

Save with Selected Fluids **3**

Rust Prevention for: 1. PARTS IN PROCESS 2. FINISHED PARTS AND EQUIPMENT



CORRECT LUBRICATION

CAREFUL selection of cutting fluids, determination of safe oil-water proportions with soluble oil—these things are vital safeguards against the rusting of parts in process.

Standard Oil (Indiana) men are helping *others* work savings without jeopardizing quality of work. Let them help you.

The man in the picture at the right is using *Stanorust*—selected for prevention of rust on finished parts and equipment because it leaves a light, colorless film which protects but does not stain.

Standard Oil products and Standard Oil men are ready at any time to help you prevent losses, work *savings*—to help *you* as they are helping others.

STANDARD PRODUCTS

SUPERLA SOLUBLE OIL—*Easily mixed with water—stable in storage—permits wide variations of concentration.*

STANORUST . . .

also ACME OILS—(*dark colored, in four grades*)
PREMIER OILS (*light colored—two grades*)
ACME BASE OILS
STANOSTAMP
STANDARD CUTTING COMPOUND

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STANDARD OIL COMPANY (INDIANA)

Practical answers to the lubrication problems met in metal working will be found in the booklets listed in the coupon at the right. Check those you desire, and attach a list of any other problems on which helpful information would be welcome right now.

Stop at Booth S-4, in the Arena Section, at the Machine Tool Exposition. Standard Oil (Indiana) Engineers will be there, ready to discuss problems with you, glad to make helpful suggestions.

Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago, Illinois (166)

Gentlemen: Kindly send copies of the papers checked to the undersigned. It is understood that no obligation is implied.

☐ "Quenching and Tempering Oils" ☐ "Metal Forming Lubricants" ☐ "Lubrication in Grinding Operations" ☐ "Lubrication in Gear Cutting Operations"
☐ "Lubrication in Honing & Lapping Operations" ☐ "The Lubrication Engineer—His Value to You" ☐ "How to Cut Costs Through Correct Lubrication in Difficult Cutting Operations"

(attach list of any additional subjects in which you are specifically interested .....)

Name .....

Position ..... *Company* .....

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City ..... *State* .....

Bronze

BUSHINGS · BEARINGS

And Parts For All

MECHANICAL APPLICATIONS

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Made to blue print. Patterns and tools for over 30,000 designs placed free at the disposal of our customer. Engineering and metallurgical counsel without cost or obligation.

BUNTING BRONZE STANDARDIZED BEARINGS
Hundreds of sizes and types of completely machined and finished bronze bushings and bearings for all conceivable applications constantly carried in stock. Write for catalog.

HIGH-LEAD BRONZES
Special low-friction alloys for engine, compressor, pump and other bearing applications.

GRAPHITED OIL-LESS BRONZE BEARINGS
For all applications where the product restricts the use of lubricants.

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Our completely staffed engineering, metallurgical and research departments serve without cost or obligation all who desire aid in determining the most suitable bearing designs and alloys for special applications.

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Made from carefully controlled alloys to customer's specifications.

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Machined and centered, cast in 13-inch lengths. 121 sizes in stock. Available from all leading mill supply dealers.

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A new and superior general purpose metal. Sold by all leading mill supply houses.

THE BUNTING BRASS & BRONZE COMPANY
The Largest Manufacturers of Bronze Bushings and Bearings in the World
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BUNTING Quality
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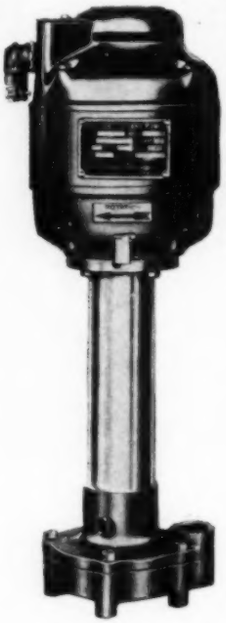
BUSHINGS · BEARINGS
MACHINED AND CENTERED BRONZE BARS

GUSHER COOLANT PUMPS



IMMERSED TYPE
MODEL UL

Friction has been minimized to the vanishing point by ball bearing construction and elimination of metal to metal contacts.

Non-lubricating liquids and grinding compounds can be pumped safely and dependably.

Constructed of one piece castings, with flanged and rabbited mountings to retain absolute alignment.

Their abundant volume of coolant speeds up production with less wear on tools.

Write us for prices and specifications.

THE RUTHMAN MACHINERY CO.
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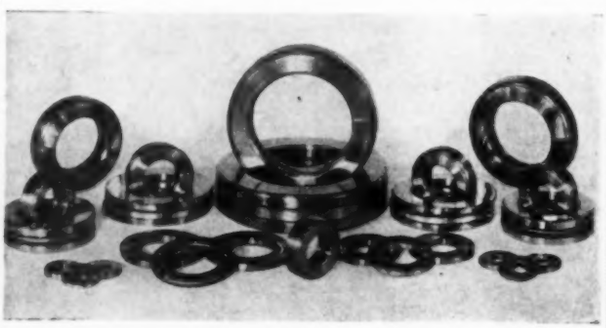
BANTAM

Ball Thrust Bearings



Carried in stock in five types and a wide range of sizes. Our facilities for the production of hardened and ground ball thrust bearings of standard or special sizes from ½″ to 60″ are unequalled. Write for Catalog.

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SOUTH BEND, INDIANA

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BBB ONE OR A HUNDRED MILLION ½₂ TO 60

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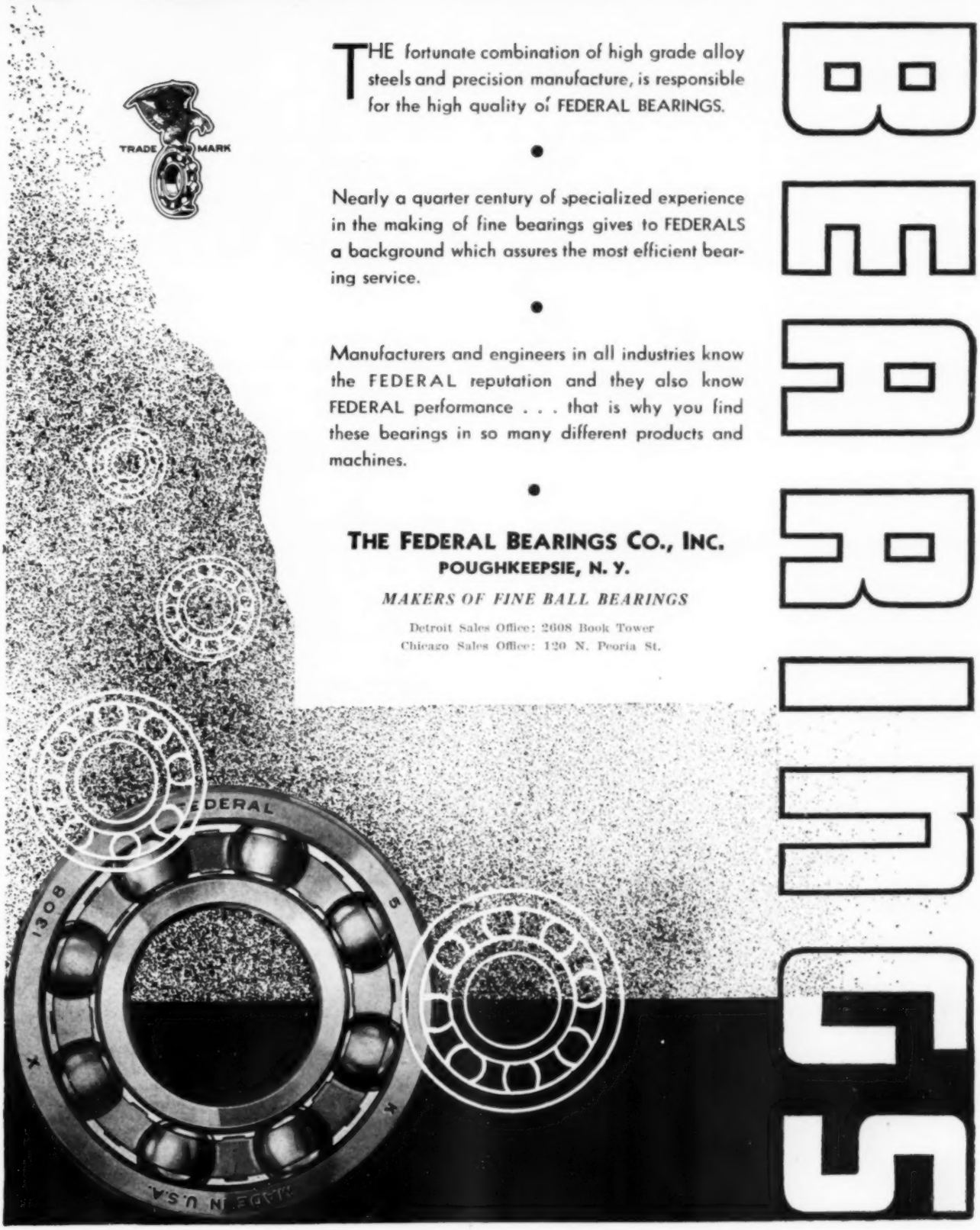

THE fortunate combination of high grade alloy steels and precision manufacture, is responsible for the high quality of FEDERAL BEARINGS.

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Nearly a quarter century of specialized experience in the making of fine bearings gives to FEDERALS a background which assures the most efficient bearing service.

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Manufacturers and engineers in all industries know the FEDERAL reputation and they also know FEDERAL performance . . . that is why you find these bearings in so many different products and machines.

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THE FEDERAL BEARINGS CO., INC.
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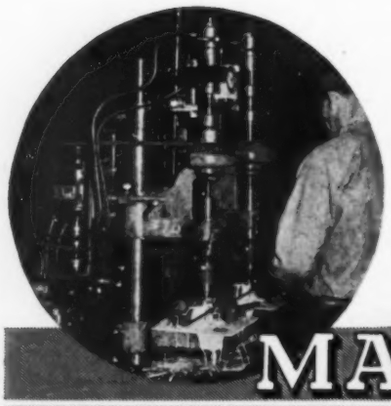
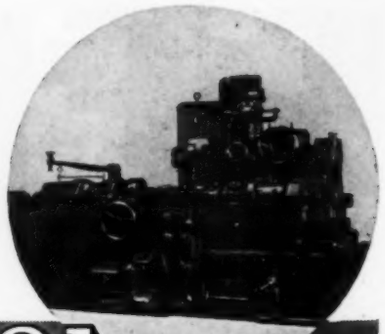


SPECIFY SKF for Machine Tools and Shop Equipment.



MACHINE TOOL PERFORMANCE DEPENDS ON BEARING ACCURACY

WHEN it's a precision job, it's a job for SKF accuracy. And, obviously, every machine tool job is a precision job. Check up on that statement yourself. You'll find SKF's in grinders, drills, lathes, in all kinds of machine tools.

Yet precision . . . the ability to insure perfect rigidity at all speeds . . . is merely one of SKF's many advantages. For SKF's meet heavy strains and stresses imposed on spindles, speed mechanisms and gears. They avoid chatter, maintain alignment, and keep going smoothly at all times.

Good bearings and good machines always keep company. And though there are many good bearings, there's only one SKF.

SKF INDUSTRIES, INC., Front St. & Erie Ave., Phila., Pa.

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BALL AND ROLLER BEARINGS

INDUSTRIES ARE BEING REBORN

on Machine Tools

AMONG THE EXHIBITORS AT THE NATIONAL MACHINE-TOOL BUILDERS SHOW, CLEVELAND, SEPT. 11–21 MANY ARE USERS AND ENDORSERS OF

SOCONY-VACUUM LUBRICANTS

THE machine-tool industry is working at top-speed—one of the first to break the shackles of depression.

Its members have set examples of courage, vision, and efficiency. They are meeting rigid production schedules and keeping costs down. In accomplishing this they are making full use of Socony-Vacuum products—cutting oils, coolants, lubricants.

And when these builders have completed their machines, a large majority of them specify Socony-Vacuum products for their operation.

THE SUM OF THESE FOUR SAVINGS

4

1. REDUCED POWER CONSUMPTION
2. MORE CONTINUOUS PRODUCTION
3. DECREASED MAINTENANCE
4. LOWER LUBRICATION COSTS

= LUBRICATION PROFIT

EVIDENCE FROM THE MACHINE SHOP

IN A GOVERNMENT arsenal machining parts from studs to 12-inch guns, tool life was increased 25%, 50%, 100%. An Ohio manufacturer reduced cutting oil cost on a gear hobber 50%. Another manufacturer, making shoe hardware, increased the life of his punches and dies 6 times.

Workers with Machines, as Workers in Metals, Find Profit in Correct Lubrication

THE WORKER in metals watches a tough ribbon of alloy steel curl from the lip of a high-speed roughing tool. A deep cut — a coarse feed — tremendous pressure between metal and tool. Yet the worker, as he watches the cut, knows that the carefully ground tool is well protected by the stream of S-V Cutting Oil which is directed at the crucial working point.

Socony-Vacuum engineers have solved this problem of metal-cutting, metal-stamping, metal-drawing. They have developed special cutting and soluble oils for every metal-working job. And shops that are using them are increasing production and cutting maintenance cost.

For your industry as well, Socony-Vacuum has a complete line of lubricants which will effect savings in the operation of your plant—savings in power, in steadier production, in lower maintenance. And together with these you will enjoy lower lubrication expense.

Sixty-nine years' experience, the world's largest collection of lubrication data, and constant research and development are the background of Socony-Vacuum Engineering Service. This service is at your disposal.

MARKETING POLICY

INDUSTRY almost always finds that the controlled use of high-grade Gargoyle Lubricants pays for itself many times over and that they actually cost less to use than ordinary lubricants. But for such equipment as does not justify the highest-grade lubricants, Socony-Vacuum engineers will recommend a lower-priced lubricant consistent with true economy.

Socony-Vacuum, with a complete line of products, can supply the lubricants best fitted for the requirements of the individual lubricating job.

SOCONY-VACUUM OIL CO.

INCORPORATED

STANDARD OIL OF NEW YORK DIVISION · WHITE STAR DIVISION · LUBRITE DIVISION · WHITE EAGLE DIVISION
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GARGOYLE
Lubricants

ONE TYPE OF PUROLATOR
PERFECTED FOR MACHINE TOOLS

Visit the Purolator
Booth
Machine Tool Show
Booth A—402
Cleveland, Ohio
Sept. 10th to 21st

IS IT PUROLATOR EQUIPPED?

THAT'S A QUESTION production engineers and shop superintendents are very apt to ask when they are considering the purchase of machine tools.

That is because the Purolator Oil Filter has met every requirement... has kept shop dust, and dirt, and metal particles from changing good lubricating oil into a harsh abrasive. These destructive substances are the cause of machine inaccuracy and frequent layups for adjustments, replacements or repairs.

If your machine tools are not Purolator equipped, let us show you the various types now in successful use. Motor Improvements, Inc., Newark, New Jersey — makers of

PUROLATOR

The Oil Filter

Protected POWER FOR MACHINE TOOLS

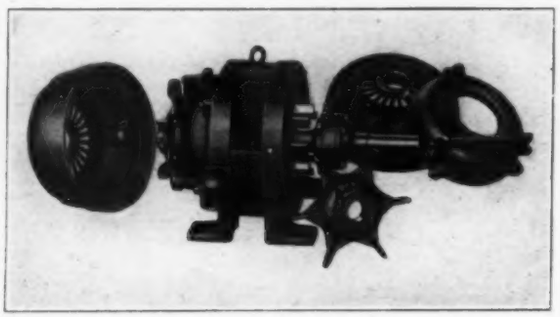
***F-M** totally enclosed dust-proof motor provides its own two-direction ventilation—seals out metal dust and abrasives*

Here's a motor that never gets into trouble because of flying metal dust and abrasives that could get into stator windings or score its shaft. It's protected power for every machine tool need. Motor efficiency steps high when the tool is new and stays high throughout its life.

Its own specially developed two-way ventilation system, including two non-clogging one-piece fans, and its cast-iron enclosing shields guarantees that the motor will not fail in the presence of dust, dirt, metallic particles, steam, moisture, abrasives or even corrosive gases or fumes in the air.

Fairbanks-Morse has built into this motor not only its traditional dependability, but an extra margin of structural refinement and capacity to guarantee correct operation under severe service conditions. And yet it takes no more mounting room and requires no more greasing or other attention than a standard ball-bearing motor.

Before you buy or specify *any* motor for any purpose, see Fairbanks-Morse first. It pays. Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill. 32 branches at your service throughout the United States.



Pioneer Designers and Manufacturers of POWER, PUMPING AND WEIGHING EQUIPMENT 105 Years

FAIRBANKS

F-M Type QCZ Enclosed Fan Cooled Motor showing end shield removed. Note fan on shaft.

See this and other F-M Motors at our booth at the Machine Tool Show. Come in and examine the many motor models which will be shown in the various stages of construction.

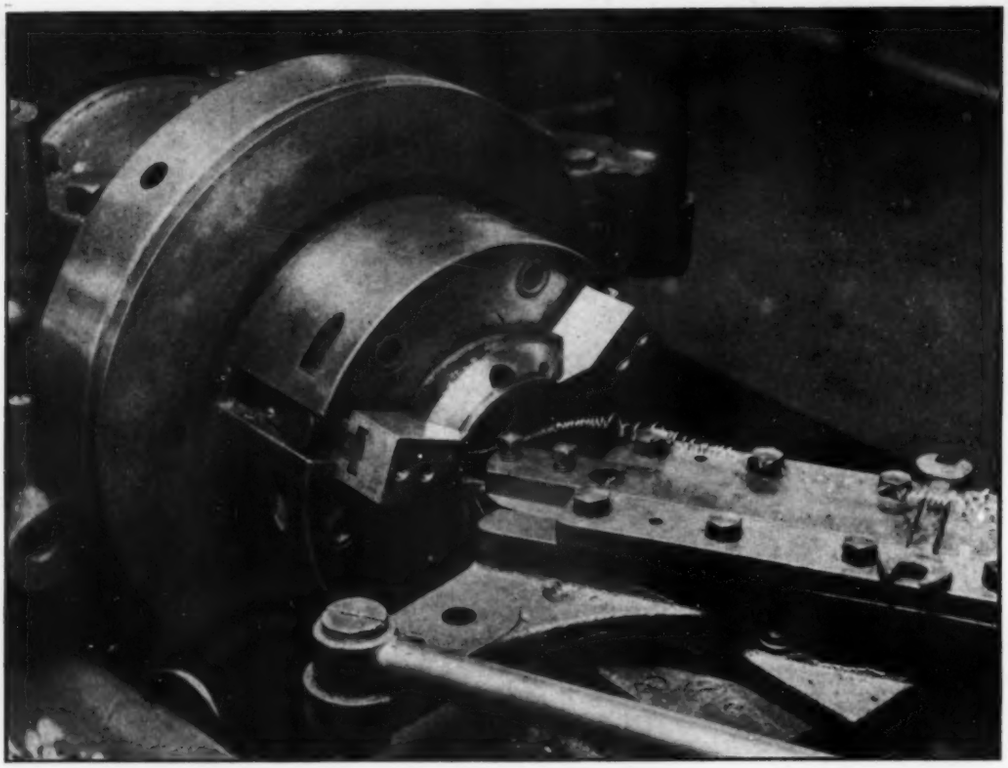
MORSE *Motors*

6468-EA40.86

BETTER THAN DAYLIGHT

Banish Reject Costs

WITH THIS DETAIL-REVEALING LIGHT



Holes, inside threads, even the shadows, are luminous when the lights are Cooper-Hewitts. Glare from polished metal surfaces is eliminated, and scratches are detected without trouble. Cooper-Hewitts enable workers to turn out uniformly better work . . . and maintain first-hour efficiency throughout a shift.

Cooper-Hewitts provide the proper *intensity* of light and the right *quality* of light to provide the maximum in modern lighting comfort. Workers do not have to waste energy in "seeing" . . . for their eyes respond very rapidly and easily to mercury vapor light.

More than sixty different industries have reduced rejects and lowered production costs by using this modern "production tool." The resultant saving in eye fatigue and reduction of accidents in the plant make Cooper-Hewitts truly a profit-producing investment.

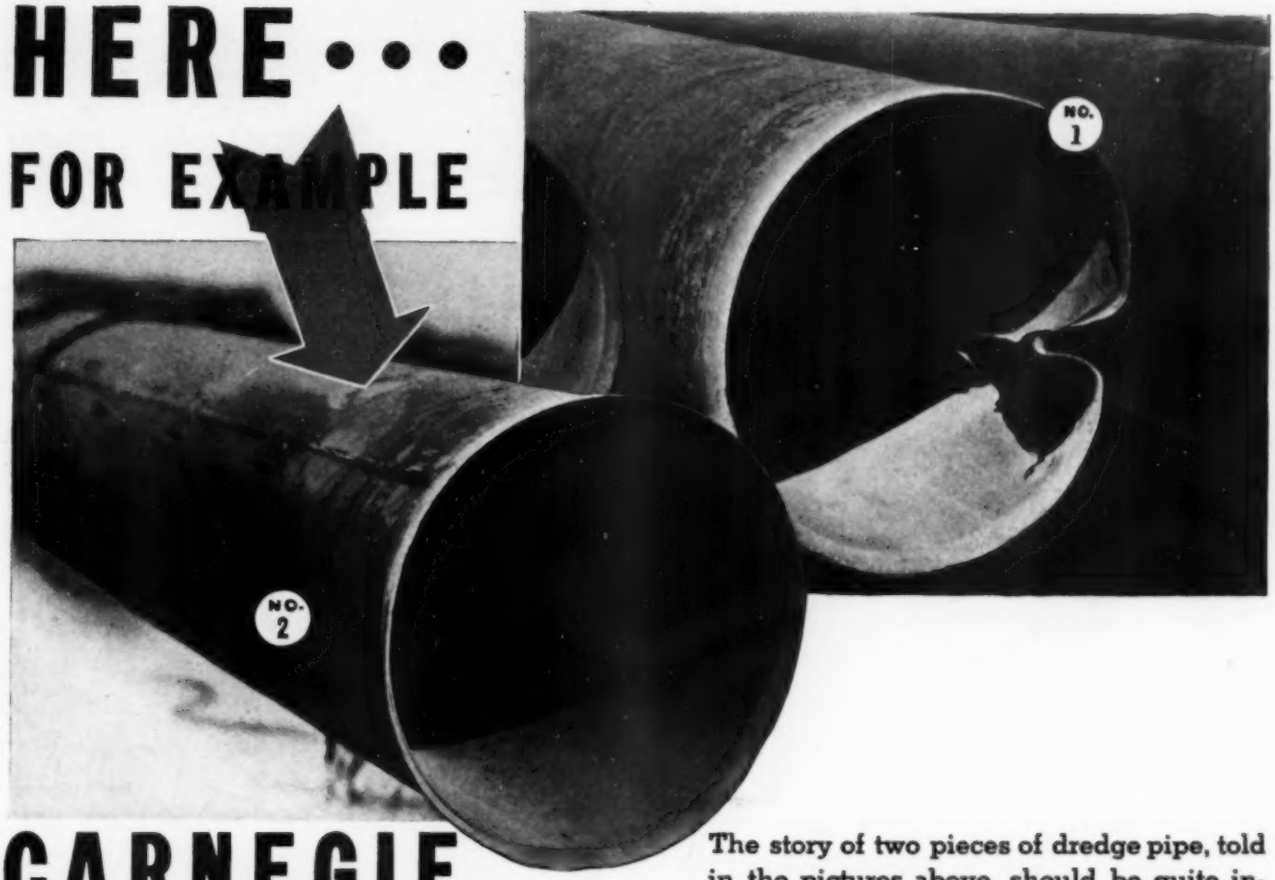
Try Cooper-Hewitts on your most difficult lighting job and bear in mind that their operating cost is no more than that of other light of equal intensity. Get full details from any representative . . . Write General Electric Vapor Lamp Company, 831 Adams Street, Hoboken, New Jersey.

GENERAL ELECTRIC

VAPOR LAMP COMPANY

648 Copr. 1934, General Electric Vapor Lamp Co.

HERE • • •
FOR EXAMPLE



CARNEGIE ★AR STEEL
proved its worth

★
ABRASION RESISTING

The story of two pieces of dredge pipe, told in the pictures above, should be quite interesting to those concerned with the problem of abrasion. Pipe No. 1, of ordinary steel, is unfit for further use after one year's service. Pipe No. 2, of Carnegie AR Steel, has also served for one year in the same installation, at the same time, under identical conditions. It should be noted that the supplementary band around the edge of pipe No. 2, worn to a feather edge, is made of ordinary steel. The user has expressed the opinion that the AR Steel pipe can be used for four or five more seasons. Naturally, Carnegie AR Steel has been specified on subsequent orders. • Results have been equally spectacular in a number of other applications. In conveyor plates, chute liners, coke screens, dragheads, hoppers, fan blades, brick and tile dies, bucket lips, dipper teeth, grinding mill plates, sand and gravel screens and a host of other uses, Carnegie AR Steel has convincingly demonstrated its worth. If abrasion is one of your problems, investigate the merits of Carnegie AR Steel.

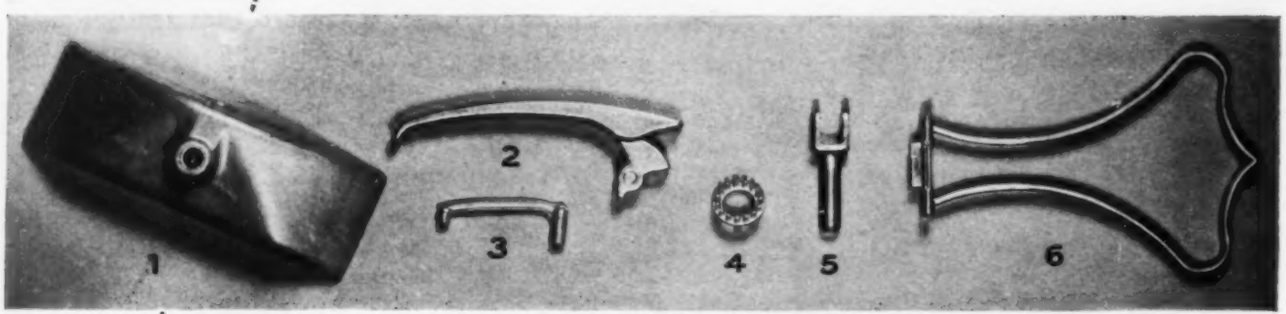
CARNEGIE STEEL COMPANY • PITTSBURGH

Pacific Coast Representatives: **COLUMBIA STEEL COMPANY** • *San Francisco*

United States Steel Corporation Subsidiaries

Why 6 manufacturers switched to Revere Brass Forgings

(TWICE-WROUGHT)



Here are actual case histories of designing and production problems solved by Revere Brass Forgings (twice-wrought). They prove five outstanding advantages of these forgings: (a) Better metal and less of it. (b) Greater strength in a lighter part. (c) Accurate and uniform dimensions with consequent economy in machining. (d) Smooth surfaces and lower finishing costs. (e) Compact and uniform structure, providing great strength and non-porosity.

1. Here's a forging used for a tank-head of an automobile heater. Formerly, the manufacturer used a brass stamping and two steel castings assembled with rivets and soldered to give proper strength to the thin brass stamping. Revere made this forging, and thereby gave him a better and stronger part. Because of the elimination of the assembly operation, the forged part cost less.

2. This is an electric refrigerator door handle. The manufacturer chose to have this made as a forging rather than a casting for two reasons. It cost less to finish, and it could be made accurate enough to fit the assembly without the extra machining that a casting requires.

3. This part is an insert for a distributor in the engine of farm machinery. A forging was chosen because of its greater strength and lighter weight, and because it can be made more accurately to fit other parts of the assembly.

4. An electric clock motor manufacturer used this tiny part in an armature assembly. Formerly, he pierced two copper washers with holes and used 16 small rivets to assemble these washers with a steel washer. The forging proved to be cheaper because it was much simpler to assemble the piece, using the studs as rivets.

5. This eye-bolt, made from a Revere brass forging, is used in a steam pressure cooker. This bolt was changed over from a screw machine part to a forging to save metal. On a screw machine it was necessary to start with a relatively large square or rectangular rod and then remove considerable metal. As a forging the part can be made to size.

6. And finally, this brass forging provides the handle for a folding tidbit dish. A forging was selected because the ultimate cost was less, due to the ease with which the part could be polished and plated.

Why don't you profit by the advantages of Revere Brass Forgings? Our Technical Advisory Service will gladly cooperate with your designers and engineers to see if Revere can save money for your plant. Address our Executive Offices for details on this service.

Revere Copper *and* Brass

INCORPORATED

Founded by Paul Revere 1801

EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK CITY · MILLS: BALTIMORE, MD. · TAUNTON, MASS. NEW BEDFORD, MASS. · ROME, N Y. · DETROIT, MICH. · CHICAGO, ILL. · SALES OFFICES IN PRINCIPAL CITIES

. . . AND IT HAPPENS TO EVERYONE

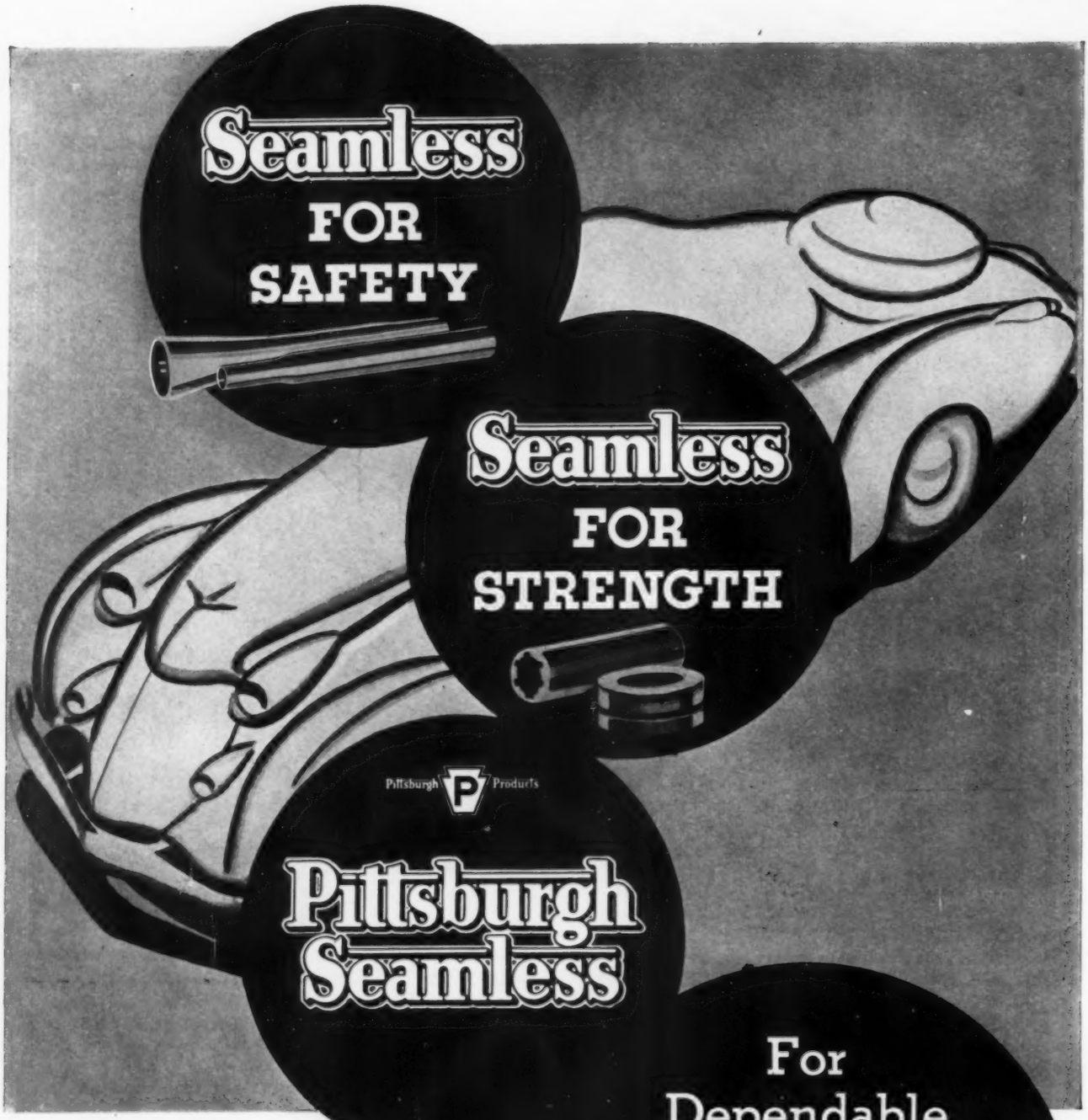
● He's calipering spring steel, cut to length from Illinois Alloy Steel. Piece by piece, it must measure up to specifications as to thickness, squareness of corners, freedom from imperfections.

Rigid, frequent inspection follows every step of the production process from billet to shipping floor. When you order bar stock ground to a specified finish, that finish is double-checked to make sure that it will meet your requirements.

In facilities for the control of production and of physicals and in the safeguards taken to assure uniformity, we know of no steel mill practice as exacting as that in the Illinois Alloy Mills.

ILLINOIS STEEL COMPANY
208 SOUTH LA SALLE STREET, CHICAGO, ILLINOIS

United States Steel Corporation Subsidiary



For Dependable MECHANICAL TUBING

PITTSBURGH STEEL CO.
PITTSBURGH • PENNSYLVANIA
New York Detroit Chicago Los Angeles
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● **Because of its strength, dependability, safety and in many cases downright economy . . . Pittsburgh Seamless Mechanical Tubing merits the consideration of the automotive manufacturer. It is available, straight or formed, for axle housings, torque tubes, steering columns, tie rods, drag links, piston pins, propeller shafts and other mechanical parts—large and small. May we discuss your requirements?**

ANNOUNCING....

PROSSER P WIDIA

PLANNED ECONOMY

...an antidote for an overdose of erroneous impressions concerning cemented carbide

METAL CUTTING OF THE FUTURE AT THE MACHINE TOOL SHOW

At Booth E-105 we will demonstrate Prosser WIDIA Tools taking heavy interrupted cuts on cast iron at 500 ft. per minute, heavy roughing cuts on steel at 700 ft. per minute, and finishing cuts on steel at 1400 ft. per minute.

You are cordially invited to witness this demonstration.

Thomas Prosser & Son has prepared a plan by which you can investigate, obtain facts first hand, and judge for yourself the value of WIDIA Cemented Carbide Tools in terms of actual savings, through a reduction in "Total Time." *

Prosser WIDIA "Planned Economy" is offered as an antidote for an overdose of "hot air" or an underdose of facts. It is a service developed by pioneers in Cemented Carbide and includes a study of your present tooling, setting up time, machining time, tool changing and regrinding time, on every metal removing operation. It includes a system for centralizing tool maintenance and set up. It is a plan, which if followed according to our recommendations, will guarantee a saving of from 15% to 75% in net cost per piece machined.

Many leading manufacturers have already investigated Prosser WIDIA "Planned Economy," and have obtained these savings. You have the same opportunity. After all, the burden of proof is up to us —and the profits up to you. In the interest of economy, write for details of the PROSSER WIDIA PLAN.

THOMAS PROSSER & SON.
15 GOLD STREET . . . NEW YORK
Detroit office 7310 Woodward Ave.

*"Total Time" represents the average total time per piece considering setting-up time, cutting time, regrinding and resetting time. The high cutting speed of WIDIA and its longer life between grinds definitely reduce "Total Time."

Be Sure and Visit Our Exhibit at the Machine Tool Show, Booth A-209

This double-end grinder is specially designed for cemented carbide tools. It has a self-contained reversible motor which enables the operator to work from both sides of the wheel.

THIS MACHINE IS ON EXHIBITION AT BERKELEY ENGINEERING CO., 1381 E. 17th St., Cleveland. During the show transportation will be furnished from the Exhibition Hall.

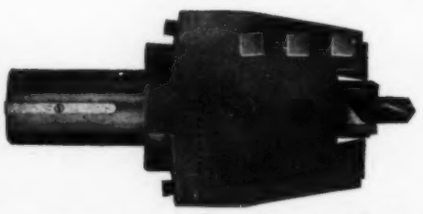
HIGH PRODUCTION STEEL AND CEMENTED CARBIDE CUTTING TOOLS FOR EVERY PURPOSE

Our standard Counterbore holder.

Wesson full floating tool holders are furnished in all sizes to customers' specifications.

Wesson multi-dimension boring bars are furnished in any size with any number of blades. The blades can be set to decimal dimensions within the size range of the tool.

Above is illustrated our cluster type construction of multi-dimension cutters.



One of the many Wesson combination drilling, boring and facing tools, made to meet customers' requirements.

WESSON CO.

1050 MT. ELLIOTT AVE. ▪ DETROIT, MICH.

BOOTH NUMBER 904

See the profit-making possibilities of . . .

CARLTON RADIALS

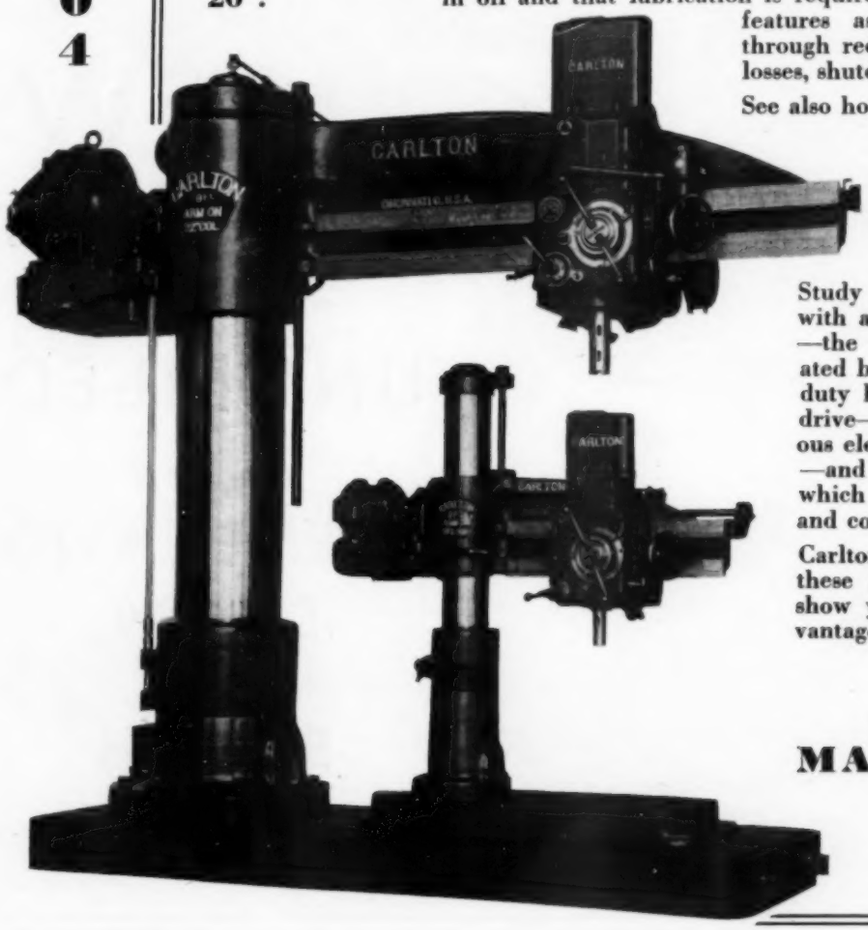
Made in sizes 3′ to 12′ length of arm.

Column Diameters 9″, 11″, 13″, 15″, 17″, 19″, 22″ and 26″.

It will be well worth your trip to Cleveland just to see CARLTON RADIALS under power, demonstrating smooth, quiet, powerful drilling.

We suggest you look into the special features—the result of 15 years intensive development—which have won such universal approval for CARLTON RADIALS as cost-cutters in many modern shops.

Note that CARLTON HEAVY-DUTY RADIAL DRILLS are equipped with ball bearings throughout—that all steel gears run in oil and that lubrication is required but twice a year. These features assure increased production through reducing friction, wear, power losses, shutdowns and renewals.



See also how CARLTON RADIALS are built on the Unit Principle—each unit having been tested before assembly and each unit fitted with its own oil reservoir and gauge to assure proper lubrication.

Study the convenience features, with all controls centrally located—the power rapid traverse operated by a push button—the heavy duty head and low hung type of drive—the time-saving instantaneous electro hydraulic column lock—and many other improvements which assure maximum production and cost cutting on every job.

Carlton engineers will demonstrate these profit-making features and show you how you can take advantage of them on your work.

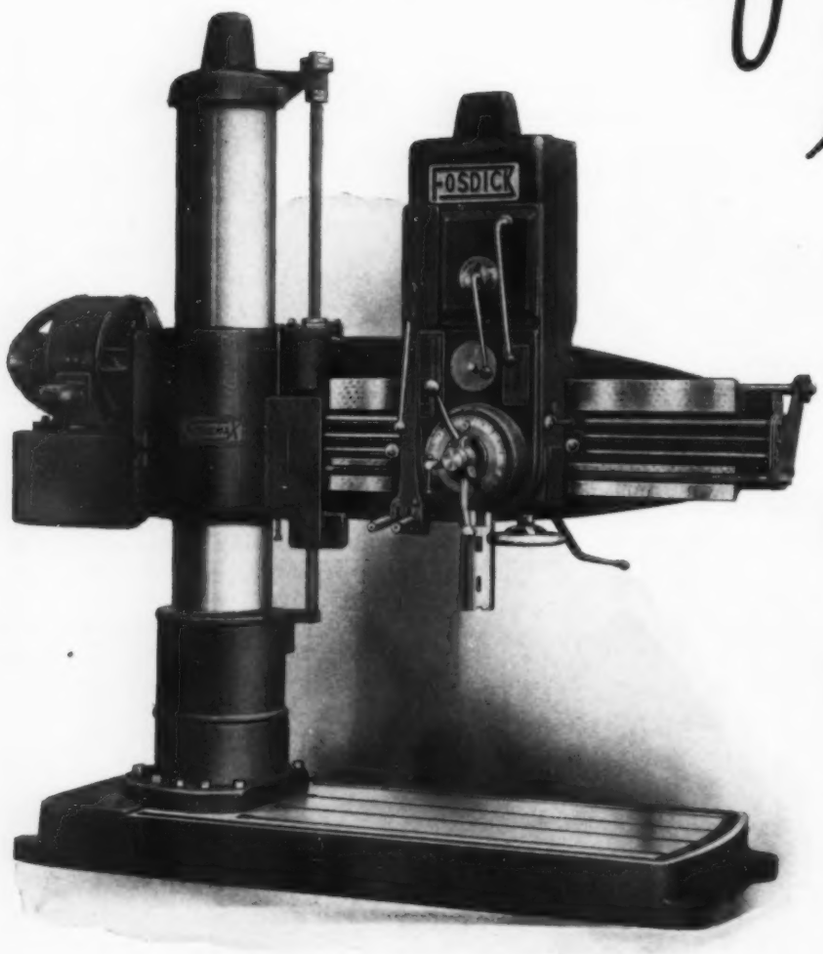
THE CARLTON MACHINE TOOL CO.
CINCINNATI
OHIO

CARLTON

FOSDICK

..Proudly presents something radically

NEW



These Machines will be

UNVEILED

at the

CLEVELAND SHOW

•

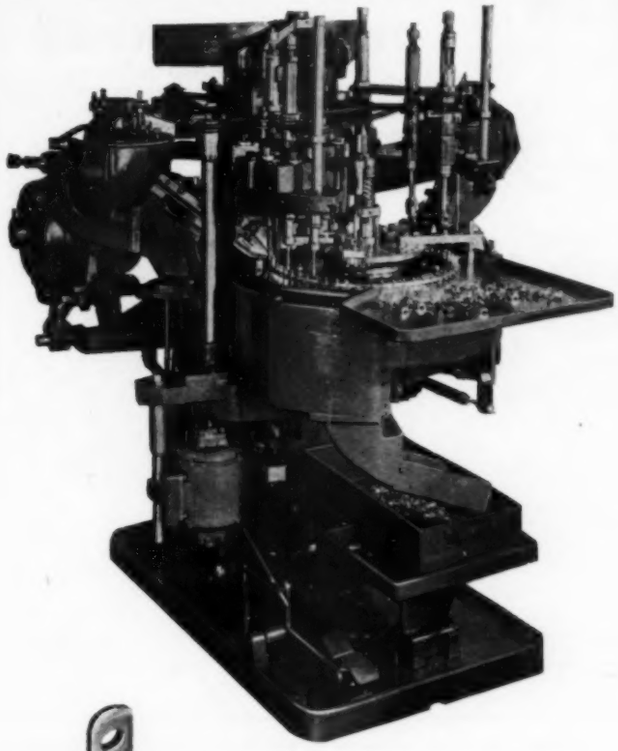
BOOTH 1004

The

FOSDICK MACHINE TOOL CO.

CINCINNATI, O.

NEW BODINE AUTOMATIC DIAL TYPE
DRILLING, TAPPING and SCREW INSERTING MACHINES



Assuring high production on small brass and steel pieces

These machines are highly flexible and with proper dial equipment will handle a multiplicity of operations. Drilling, milling, saw slotting and reaming spindles are standard accessories. Screw inserting mechanisms, screw spinning and backing off spindles and side drilling and tapping spindles, all adjustable, provide a machine adaptable to a wide variety of work.

Full automatic except feeding. Magazine or hopper feed can be readily added. The use of clutches for reversing spindles is eliminated, a geared tooth segment and a train of gears being used to drive spindles in alternate directions.

• • • • • • • • •

Available in a number of sizes and types. Send blue prints or specifications of your work for an estimate of what these machines will do for you. Write today for Descriptive Bulletin.

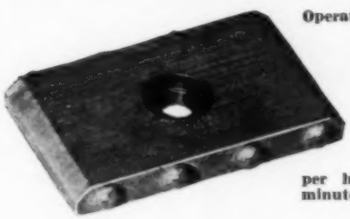
The Bodine 40-20 Dial Tapping machine equipped for production of contact prongs.

Operations: Tap 6-32 hole • Insert screw from hopper • Spin (stake) screw on end • Back screw out to end.

Production: 4500 pieces per hour at 45 strokes per minute, two pieces per stroke.

• • • • • • • • •

The Bodine 48-30 Dial Drilling machine equipped for the production of armatures for automobile horns. Material is laminated hi silicon steel electrical sheet.

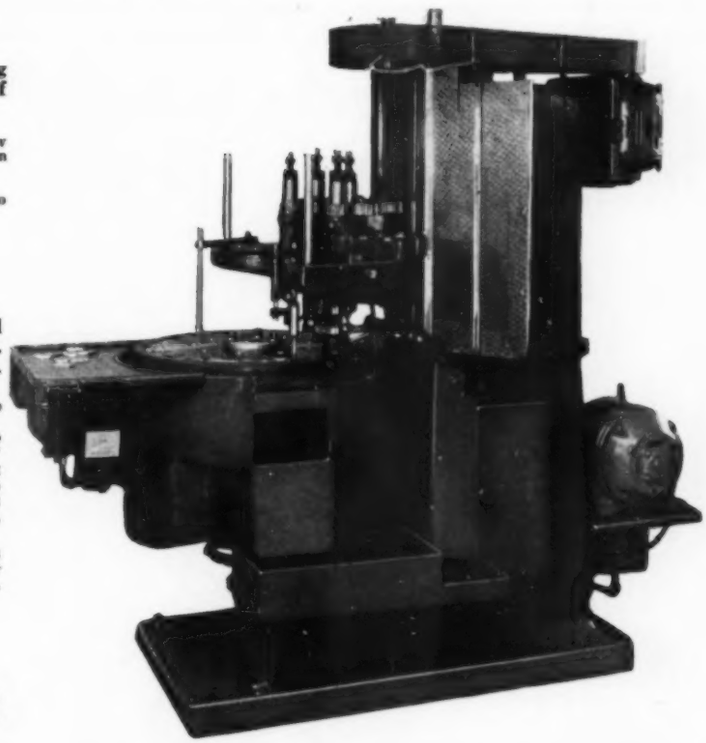


Operations: Drill one ¼" hole ¾" through piece • Counterbore hole to 15/32" diameter, 1/16" deep • Countersink hole on opposite side to ½" diameter • Eject from dial automatically.

Production: 1110 pieces per hour at 22 strokes per minute, one piece per stroke.

• • • • • • • • •

Have you drilling or tapping production problems? Give us the facts, let our engineers study your problem and make recommendations.

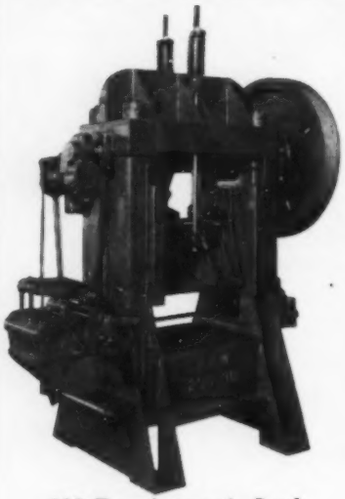


THE BODINE CORPORATION

1720 Fairfield Avenue
Bridgeport, Connecticut

Henry & Wright Equipment Builds Stamping Profits

AUTOMATIC STEEL PRESSES **DIEING MACHINES**



100 Ton Automatic Steel Press

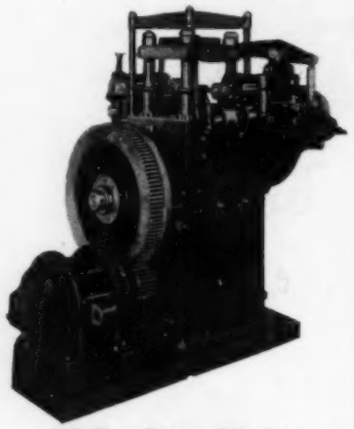
Automatic stamping equipment cuts costs—increases output—betters product.

Using progressive dies to produce intricate or simple stamped parts at each stroke of machine, Henry & Wright equipment will build profits for you.

The improved Dieing Machine is available in from 10 to 300 ton capacities. The Automatic High Speed Steel Press is furnished in flywheel and geared types of capacities from 25 to 400 tons. Built for high speed precision work, these machines give maximum results.

BOOTH E-308
National Machine Tool Show

Write for Catalogs



25 Ton Dieing Machine

THE HENRY & WRIGHT MANUFACTURING CO.
HARTFORD, CONNECTICUT

Executives going to the
MACHINE TOOL SHOW
at Cleveland SEPT. 11-21

ARE INVITED TO SEE OUR EXHIBIT IN BOOTH **201**

SENSITIVE BENCH DRILLING MACHINE
TOOL ROOM SPECIAL "R 53"

The sensitive FEEL enables operator to avoid breaking drills.

From smallest diameter hole to ¼ inch.

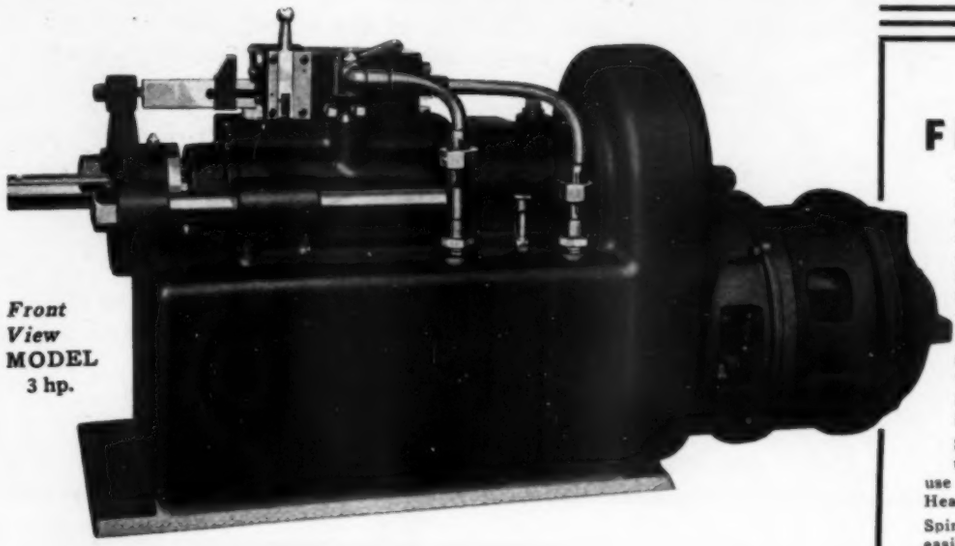
THREE GEOMETRIC SPEED RATIOS
1500, 3000, 6000 R.P.M. Thru Endless Belt.

HIGH SPEED HAMMER CO., INC.
305-321 NORTON ST. - - ROCHESTER, N. Y.

ELIMINATE EXPENSIVE DRILLING EQUIPMENT FROM YOUR PRODUCTION LINE

DO IT WITH HOEFER

Self-Contained HYDRAULIC FEED UNITS



Front View MODEL 3 hp.

The Hoefer Self-Contained Drilling Units were designed to meet today's need for maximum flexibility in production drilling equipment. One or more of these units, mounted on suitable, inexpensive supports or bases, equipped with Hoefer Multiple Spindle Drill Heads will answer every requirement of the specially designed production drilling machine at a fraction of the cost. Furthermore, with this arrangement, the high cost of obsolescence is avoided. When the part becomes obsolete because of the re-design of the product, only the comparatively inexpensive base or supports and the work-holding device need be discarded. The Hoefer Units are never obsolete—and can be used, with perhaps a new base, in the construction of a new drilling setup for the new part.

Hoefer Self-Contained Hydraulic Feed Units are built in five sizes, ranging from 1½ to 10 h. p. Each unit is entirely self-contained with motor, hydraulic pump, sump, feed circuit control, speed change and spindle.

Hoefer Units may be operated in any position to suit the requirements of the work, horizontally, vertically, or at any angle. They are simple in design, and of unusually clean construction. The entire hydraulic circuit with the exception of the cylinder and piston is located in the base of the unit. The rate and length of feed easily and quickly adjusted.

Write for complete details.

HOEFER MFG. CO., Inc., Freeport, Ill.

FEATURES:

One or several mounted on a suitable, inexpensive base, or on another machine make up a special high production machine at a fraction of the cost for specially-designed equipment.

Hoefer Units are never obsolete—they can be used again and again with different setups.

Work cycle can be changed instantly from continuous to interrupted, or vice versa.

Single or multiple tools can be used with equal facility, by the use of Hoefer Multiple Spindle Heads.

Spindle Speeds may be changed easily and simply by means of pick-off gears.

Any rate of feed from zero to forty feet per minute available.

Different lengths of spindle travel can be furnished and are readily adjusted within the range of the unit.

Reciprocating motion for honing and lapping easily obtained.

Anti-friction bearing throughout.

A great variety of work cycles can be furnished.

A dwell for facing and similar operations can be provided.

SEE OUR EXHIBIT *at the* MACHINE TOOL SHOW

CLEVELAND

BOOTH NO. 12

A HOEFER *HYDRAULIC FEED UNIT IS NEVER OBSOLETE*

SUPER HIGH SPEED — SUPER SENSITIVE

Ettco-Emrick TAPPING ATTACHMENT

THEY RUN IN A PUMPED OIL BATH. There can be no argument about the necessity of this at high speed.

ALL HELICAL GEARS Quiet, smooth, no vibration.

BALL AND NITRALLOY BEARINGS. Taking full advantage of modern bearing practice.

A SURFACE CARBORIZED ASBESTOS-BAKELITE CONE FRICTION CLUTCH RUNNING IN OIL. A new wear proof material patented by us.

Some folks have cut tapping costs as much as 300% with this tool.

Some gain just because of less operator fatigue.

There is no question but that better holes are tapped.

It is smooth and quiet without vibration. There is a skilled sensitiveness to it that saves tap breakage.

The life of the tapper, running in oil, is longer than one would reasonably expect.

TRY ONE AT 2000 R. P. M.

We'll ship on 30 day trial. Get used to high speed tapping — it's surprising.

TWO SIZES NOW READY

No. 100 — 3/16" in steel, for fast fine tapping.
No. 200 — ¼" in steel, for general use.

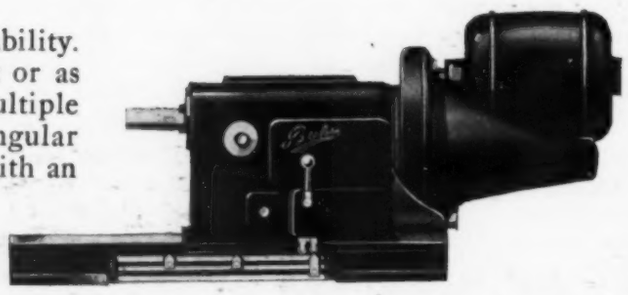
SEND FOR DESCRIPTIVE BULLETIN

ETTCO TOOL CO. 596 JOHNSON AVE. **BROOKLYN, N. Y.**

Buhr PATENT

HYDROSCRU POWER UNIT

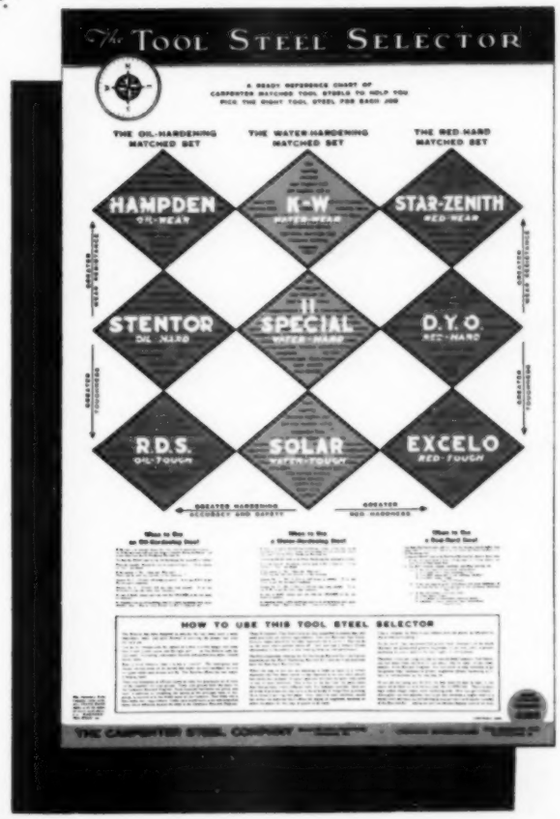
Embodies flexibility and interchangeability. May be used either as a single unit or as two, three or fourway setups with multiple head and combinations of vertical, angular and horizontal. Its large capacity with an 18-in. minimum stroke and feed changes accomplished by pickoff gears make a flexible unit for Drilling, Reaming, Spotfacing, Tapping and similar operations. For step drilling, accessible control dogs govern the distance of feed and rapid traverse.



Have you a problem involving Multiple Drilling, Tapping, Spotfacing equipment? Send us your blue prints or have one of our engineers talk it over with you.

BUHR MACHINE TOOL COMPANY

ANN ARBOR, MICHIGAN

New! TO HELP YOU GET BETTER TOOLS

Exhibiting at the **MACHINE TOOL SHOW** *September 10th to 21st* **BOOTH No. A-501**

Exhibiting at the **NATIONAL METAL CONGRESS** *September 30th to Oct. 4th* **BOOTH No. C-20**

NOW CARPENTER makes it easier for you to get better tools and bigger production. For the first time, a tool steel manufacturer has developed a plan that helps you to pick the *right* tool steel for each job. Carpenter Matched Tool Steels have made this possible - - and the Tool Steel Selector is the chart that points the way. Look for this chart when you visit the show - - learn how it can help you to get better tools, or write for the Tool Steel Selector Wall Chart for use in your tool room. The Carpenter Steel Company, Reading, Pa.

Specify Carpenter MATCHED TOOL STEELS

New! THE NEW METAL FOR THE NEW AGE

HERE is added beauty for your product - - everlasting brilliance - - greater sales appeal - - resistance to corrosion - - increased strength and rigidity - - genuine improvement.

The new age demands these advantages and Stainless Steel provides them - - in the tiniest valve or the modern stream line trains. Stainless Steel is the New Metal for the New Age!

Carpenter Stainless Steels long ago passed through the laboratory stage. They have been tested and proved by experience - - and they have earned their reputation on performance.

Many manufacturers have found that they can go further and solve their problems more easily and more economically with Carpenter Stainless Steel - - backed up by Carpenter service.

Carpenter is ready and eager to help you improve your product with Stainless. Visit us at the Show - - or write us about your problem.

THE CARPENTER STEEL COMPANY, READING, PA.

Exhibiting at the MACHINE TOOL SHOW September 10th - 21st BOOTH No. A-501

Exhibiting at the NATIONAL METAL CONGRESS September 30th - Oct. 4th BOOTH No. C-20

Specify Carpenter STAINLESS STEELS

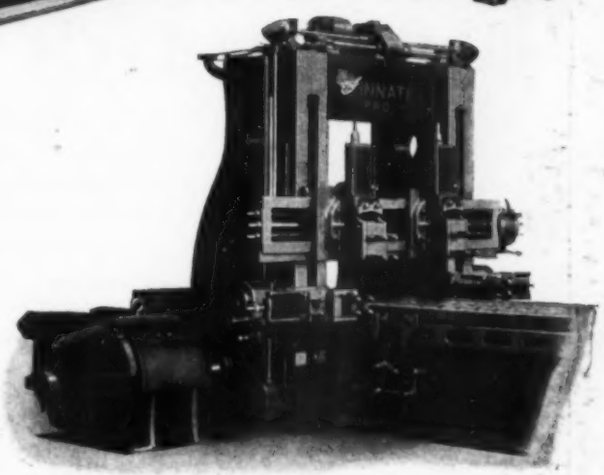
CINCINNATI...

for Dependable

PLANERS AND BORING MILLS

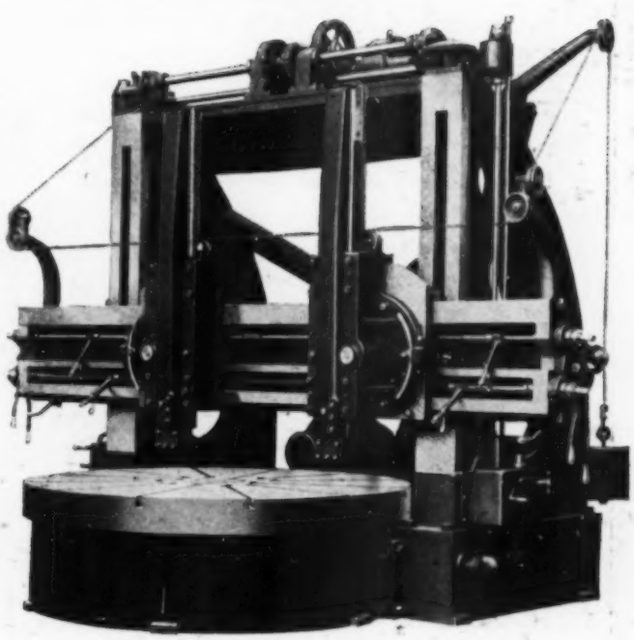
The production efficiency, accuracy, and dependable service obtained by users of Cincinnati Planers and Boring Mills make these tools first choice when additional equipment is required. There's real satisfaction in equipping with machinery that has a fine reputation for dependability. There is a Cincinnati Planer in operation in a plant near yours. See it. Ask the user about it. Then investigate the New Cincinnati Planers . . . Boring Mills too. Literature will be sent on request.

Cincinnati Hypro Openside Planers, also built in 24" to 120" sizes—with cutting and return speeds up to 240' per minute now available.

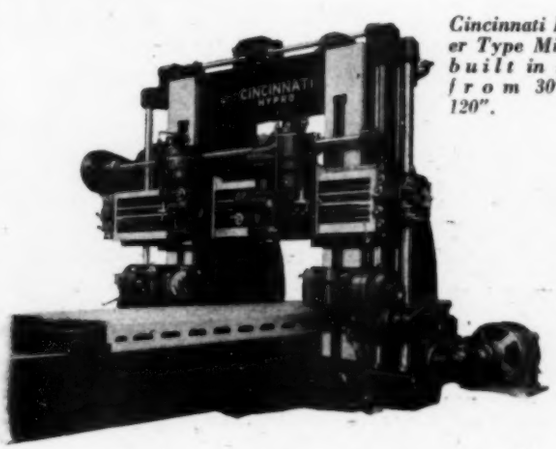


Cincinnati Double Housing Planers built in sizes 24" to 120"—cutting and return speeds now available up to 240' per minute.

CincinnatiVertical Boring Mills built in sizes from 4' to 12'.

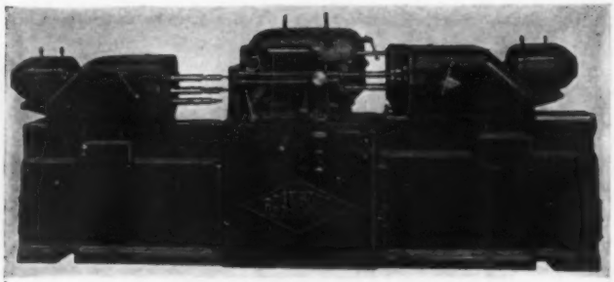


Cincinnati Planer Type Millers built in sizes from 30" to 120".



THE CINCINNATI PLANER COMPANY

Cincinnati, Ohio, U. S. A.



Drilling, Reaming and TAPPING with Hydraulic Operating Cycle

Here's important news! The Rockford 3-Way Machine shown above has an automatic *hydraulic* operating cycle which includes *tapping*. Machine operates on Diesel engine cylinder blocks, in two sizes. First a batch of blocks are put through for drilling on three sides. Then the machine is reset, quickly and easily; taps and reamers substituted for the drills, and the same batch of parts is put through again. Operation cycle is entirely automatic after starting. When control lever is engaged, all three heads approach the work-piece rapidly, trip to feeding rate, tools feed through the work, then heads return quickly and stop. As the taps start to back out they reverse automatically. Our patented control for the hydraulic tapping cycle eliminates possibility of tap breakage originating in the machine. In the large cylinder block, a total of 27 holes are drilled simultaneously from three directions in the first operation, 19 holes are tapped and 3 are reamed in the second operation. Production is so high that one machine meets present requirements, and does so at very low cost.

For reliable estimates on a wide variety of drilling, boring, reaming, tapping, facing, and similar operations at maximum efficiency and economy, consult our engineering department.

ROCKFORD DRILLING MACHINE CO.
112 Catherine Street Rockford, Illinois, U. S. A.

FASTER and more ACCURATE BLANKING

with Littell Automatic Centering Reels

Capacity No. 3 Reel — 300

Capacity No. 5 Reel — 600

WHERE coils are perfectly centered as on the Automatic Centering Reels, jerking of the stock is eliminated and little effort is required to pull the coil on the part of the Roll Feed, in automatic feeding, or by the operator in hand feeding. This means greater production each hour on each of your punch presses.

The loading bar enables one man to load coils up to 400# in two minutes on Littell Automatic Centering Reels.

Manufacturers of Automatic Feeds for all makes of Punch Presses.

F. J. LITTELL MACHINE COMPANY
4127 RAVENSWOOD AVE. CHICAGO

DEALERS WANTED

We have available unassigned territories for the sale and distribution of

EISLER WELDERS

EISLER DISTRIBUTORS

CLEVELAND DUPLEX MACHINERY CO., Cleveland, Ohio.
HUNTER & HAVENS, INC., Hartford, Connecticut.
CHAS. A. STRELINGER CO., Detroit, Michigan.
NORTHERN MACHINERY & SUPPLY CO. Minneapolis, Minnesota.
E. L. ESSLEY MACHINERY COMPANY, Chicago and Milwaukee.
AUSTIN-HASTINGS COMPANY, Cambridge, Massachusetts.
MONTGOMERY & CRAWFORD, INC., Spartanburg, So. Carolina.
HARRON, RICKARD & MCCONE, INC., San Francisco and Los Angeles.
INDIANA MACHINE TOOL & SALES CO., Indianapolis, Indiana.

DEALERS INTERESTED in handling our welders are invited to consult Chas. Eisler at the Hotel Cleveland, Cleveland, during the National Machine Tool Exposition, September 10 to 15 inclusive, or write to the

EISLER ENGINEERING CO.
745 SO. 13TH ST. NEWARK, N. J.

Your Machine Tools Need . . .

POWER DRIVES THAT WILL GIVE YOU FULL ADVANTAGE OF THE PRECISION AND PRODUCTION SPEED WHICH MAKE TODAY'S MACHINE TOOLS THE BEST BUY EVER OFFERED INDUSTRY

Diamond Roller Chain Drives will keep your production rate just where you want it and enable you to get the most out of your machinery because

- They are Positive — permit no slip: the speed of the driven shaft remains exactly at the rate selected for the job. There is no gradual slipping, no slowing down of production or efficiency.

When you specify Diamond Roller Chain Drives on your machines or put them in your plant you also get drives that are

- Clean, Quiet and easy to install and take care of.
- Suited to short, medium or long centers; high, medium or slow speeds.
- Saving of Space; more capacity per inch of width than any other type of transmission.
- Saving of your Power Bills; 98-99% efficiency is permanently maintained.
- Saving of your Investment; they last longer.

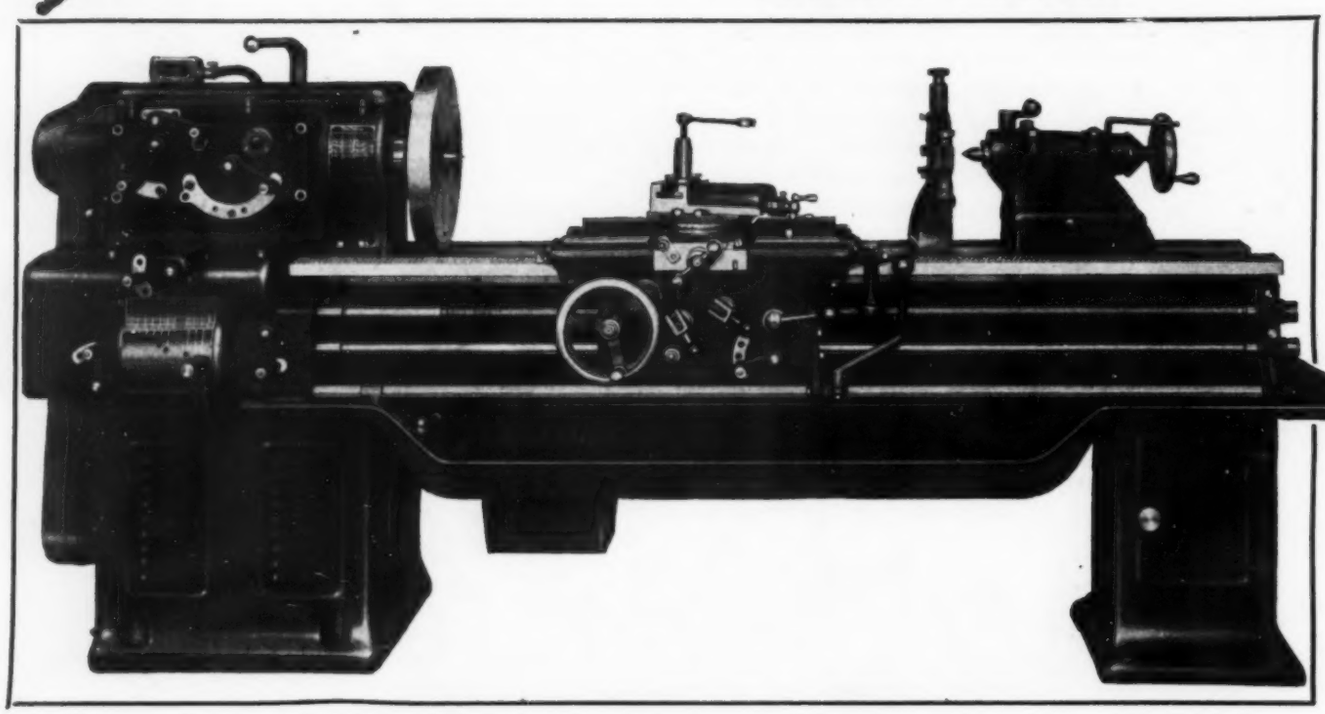
Diamond Roller Chain Drives may be had through the machinery builder, our distributors located in all principal cities or from the factory. Drives to meet most requirements are carried in stock. One or two Diamond Drives installed in your plant will be thoroughly convincing of the advantages they have for you. DIAMOND CHAIN & MFG. CO., 405 Kentucky Ave., Indianapolis, Ind. *Offices and Distributors in all Principal Cities.*

Diamond triple-strand chain on 7½ hp., 1750 R.P.M. drive; 19 teeth on motor sprocket, 106 teeth on driven sprocket.

DIAMOND CHAIN

Improvements in . .

TRITROL ENGINE LATHES



TRITROL FEATURES

1—Herringbone gears—no tooth marks—no end thrust
2—Timkenized headstock
3—Anti-friction quick-change gear box
4—Anti-friction apron bearings
5—Automatic lubrication for carriage cross slide and bed ways
6—Anti-friction bearings in end gear train
7—Quick-acting snap levers for apron feeds
8—Automatic force feed lubrication in headstock with oil filtered before distribution

Here's the lathe that offers everything for high speed, accurate work. Look it over carefully.

Three levers, conveniently located and easily operated, provide for 16 spindle speeds.

Constant mesh herringbone gears and Timken bearings assure uniform and smooth spindle rotation regardless of the speed. The use of these herringbone gears entirely eliminates end-thrust, regardless of whether the spindle is running forward or reverse.

Then, too, the TRITROL features nickel steel bed and carriage ways and a positive snap lever apron control with an instant response.

The SIDNEY MACHINE

. TURNING *and* MILLING *you can't afford . . to overlook . . in the* SIDNEY LINE

It is decidedly to the advantage of production men, foremen, and operators to study the improvements in Sidney Lathes and Milling Machines.

These outstanding developments have been made with one objective in view—to meet the shop man's requirements of greater convenience in operation, easier set up and higher production with less effort.

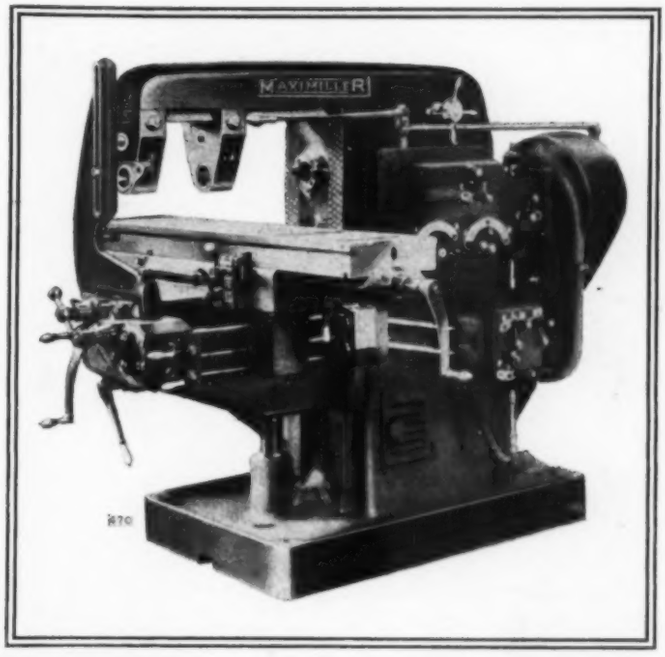
You are invited to bring your production problems to Sidney engineers who will be happy to explain how they can be met in the features offered by Sidney's advanced construction.

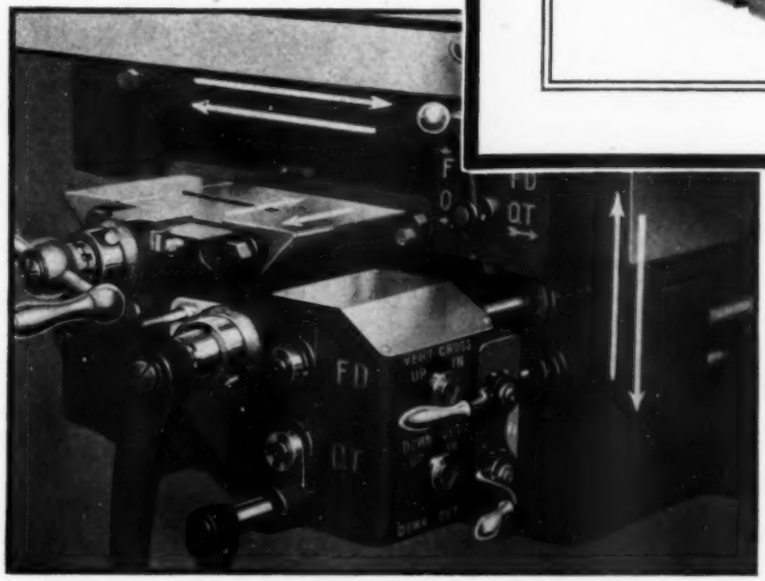
THE MAXIMILLER

Here, too, is advanced design—with the operator in full control of work motion in any direction as well as starting or stopping cutter, locking in position table movement, etc.

The **MAXIMILLER** features a perfected "solid, one-piece, adjustable gib" which assures delivery of maximum power at the cutter without chatter, obtaining the highest degree of accuracy in the work produced. Production is limited only by the quality of the cutter.

We can't begin to tell you all the story here. Tell us what your milling problems are and let us supply complete data on a machine that will solve them. The **MAXIMILLER** is built in four sizes in plain, universal and vertical types.





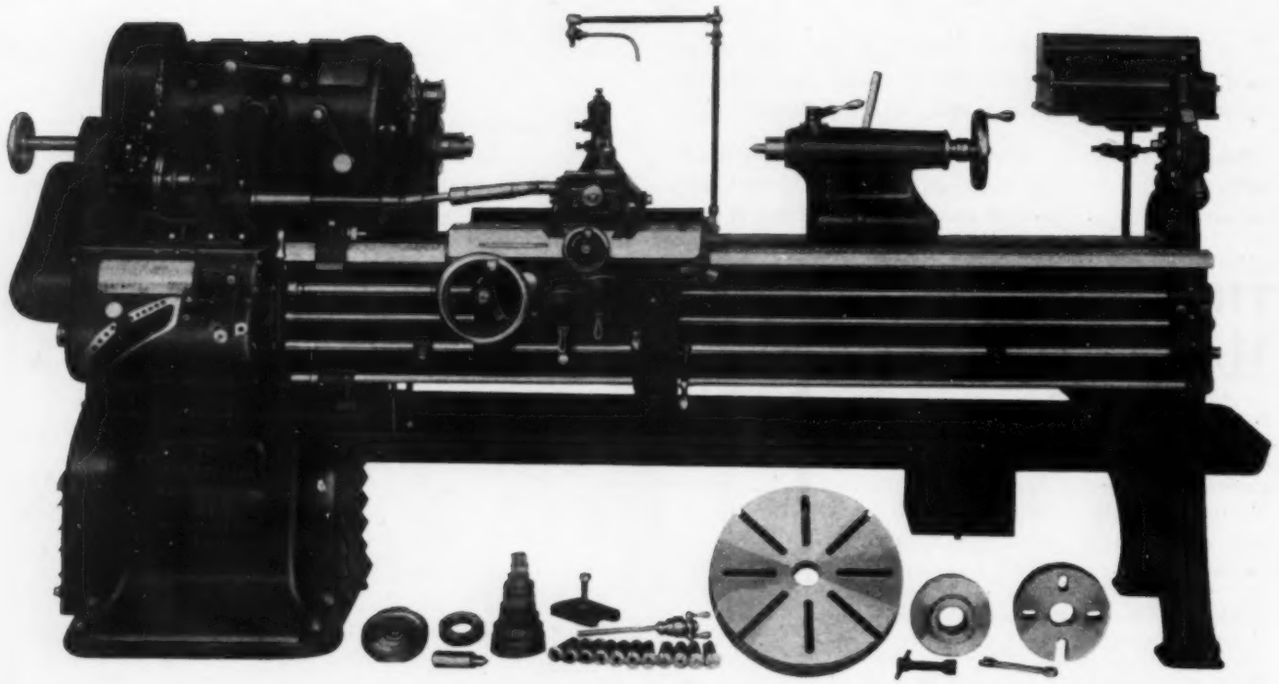
MAXIMILLER FEATURES

1—Power feed in all directions (selection of 18)
2—Power Quick Traverse in all directions
3—Power Quick Traverse available with cutter stationary or in motion
4—Anti-friction bearings throughout — spindle included
5—Sliding Gear Transmission for Speed and Feed Changes
6—Centralized Control for all movements
7—Rigid Cutter Support—Large rectangular overarm
8—Wide saddle with **EXTENDED BEARINGS** on **BOTH SIDES** for increased work support

Tool Co., SIDNEY, OHIO

SPRINGFIELD exhibits in CLEVELAND

Booth No. 800



Anticipated Accuracy

TO say that Springfield Lathes meet modern requirements is stating merely part of the facts.

Springfield engineers have looked not only to the present in the development of precision performance but have anticipated future trends in the modernization of machine tool practice. They are PRECISION LATHES, according to today's standards and can be depended on to perform extremely accurate work after years of continuous service — in either toolroom or on production.

By all means make it a point to study the outstanding features of design which are responsible for the wide acceptance of Springfield Lathes in modern progressive shops.

You'll be impressed with the 12-spindle speed headstock and the care taken to reduce wear and assure long, quiet, smooth, uniform, spindle action — with main spindle mounted on Timken Tapered Roller Bearings.

Then, too, note the efficient and durable apron of double wall box type construction for sturdiness and assurance of fast and heavy cutting without strain. See also the heavy duty, practical, simple compound rest, with the full 360° swivel — the wide carriage bridge with unusually large bearing surfaces — the heavy durable tailstock with exceptionally long spindle travel.

Then watch the Springfield perform — ask questions — put your problems up to Springfield engineers for a money-saving solution.

If you don't attend the Cleveland Show, write for detailed information.

THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD OHIO

DUPLICATE DIES
IN ONE-HALF THE TIME!
AT ONE-HALF THE COST!

NEW! *See it in Operation* at Cleveland Show . . . Booth "H" in Arcade

Die-Casting Dies . . . Small Drop Forging Dies . . . Molds for Rubber, Glass, Plastics, etc., are reproduced with an average SAVING OF 50% by the new Gorton Duplicators.

These Duplicators operate from an original die or mold, and can also duplicate from models made of Bakelite, stone composition or other materials. No pattern is too complex for them to reproduce accurately. Deep serpentine grooves, steep angles and sharp shoulders are followed with ease and speed. Quick set-up permits reproduction of single dies at little more cost than quantities, and any good mechanic can learn in a few minutes to turn out accurate work.

Investigate these unusual, new, money saving machines. A booklet showing samples of work and production time, with details of the Duplicators, is yours for the asking.

GEORGE GORTON MACHINE CO.

GORTON

1103 13th STREET, RACINE, WISCONSIN

FLEXIBLE LIBBY UNI-FLEX

A modern, general-purpose machine adapted to large quantity production — will bore, turn, face, form, drill, recess, thread, ream, undercut, tap, etc., either straight or taper simultaneously.

Cuts threads from 2 to 32. Has 72 feeds in either direction in both aprons independent of the rapid traverse. Feeds range from .007 to .500 in either direction in each apron.

Newly Developed Power Feed

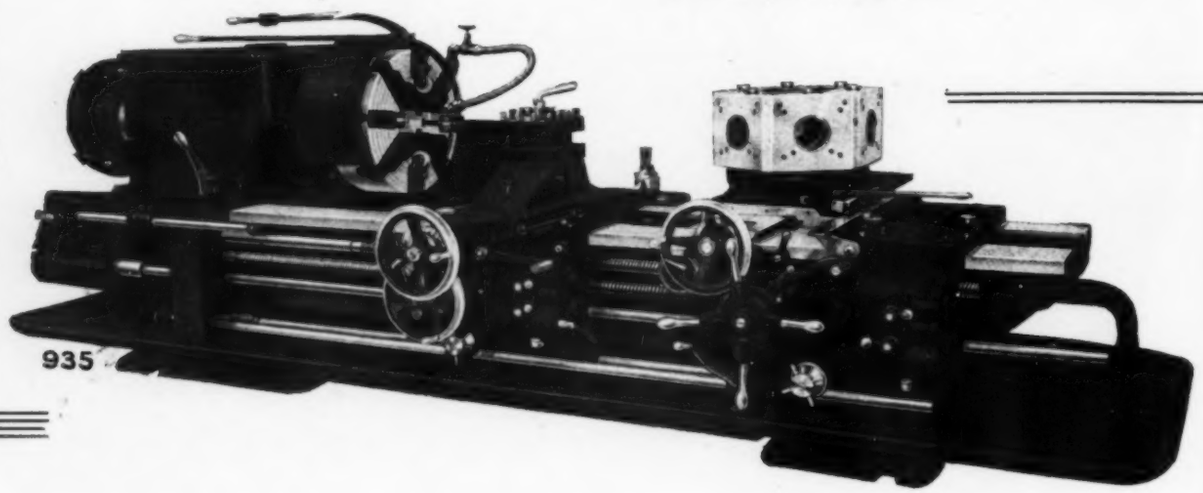
CROSS SLIDING-TURRET

Enables this machine to turn out lots as small as 1, 2, or 3 pieces AT REAL SAVINGS

Formerly this type of machine was considered suitable only for rough work or work in large quantities, because of tool cost and set-up time. Now, all of this is changed—now a new type machine is available with many money-saving possibilities. The power feed cross sliding-turret has the same rigidity and accuracy as the stationary turret. Today users are finding that they can machine a wide variety of bar and chucking work in small lots at a great reduction over prevailing costs. But that isn't all, the entire machine is re-designed to give you many superior operating features. In fact, it is something for you to write to us about because it is an opportunity with a direct bearing on better profits.

INTERNATIONAL MACHINE TOOL CO.

Indianapolis, Indiana



Libby UNI-FLEX

GENERAL PURPOSE MACHINE

Many testmonials received—here's one!

"This machine cost us set up, including foundations, about $10,000, and from our cost data, WE KNOW IT PAID FOR ITSELF WITHIN A YEAR."

Let us show you what the LIBBY UNI-FLEX will do on your work —large or small lots. See what many other users have to say and how they prove every claim we make.

INVESTIGATE NOW!

HIGH PRODUCTION • EXTREME ACCURACY LOW OPERATING COST . . . *Assured with the New 4- and 6-Spindle* "MODEL K CLEVELAND"

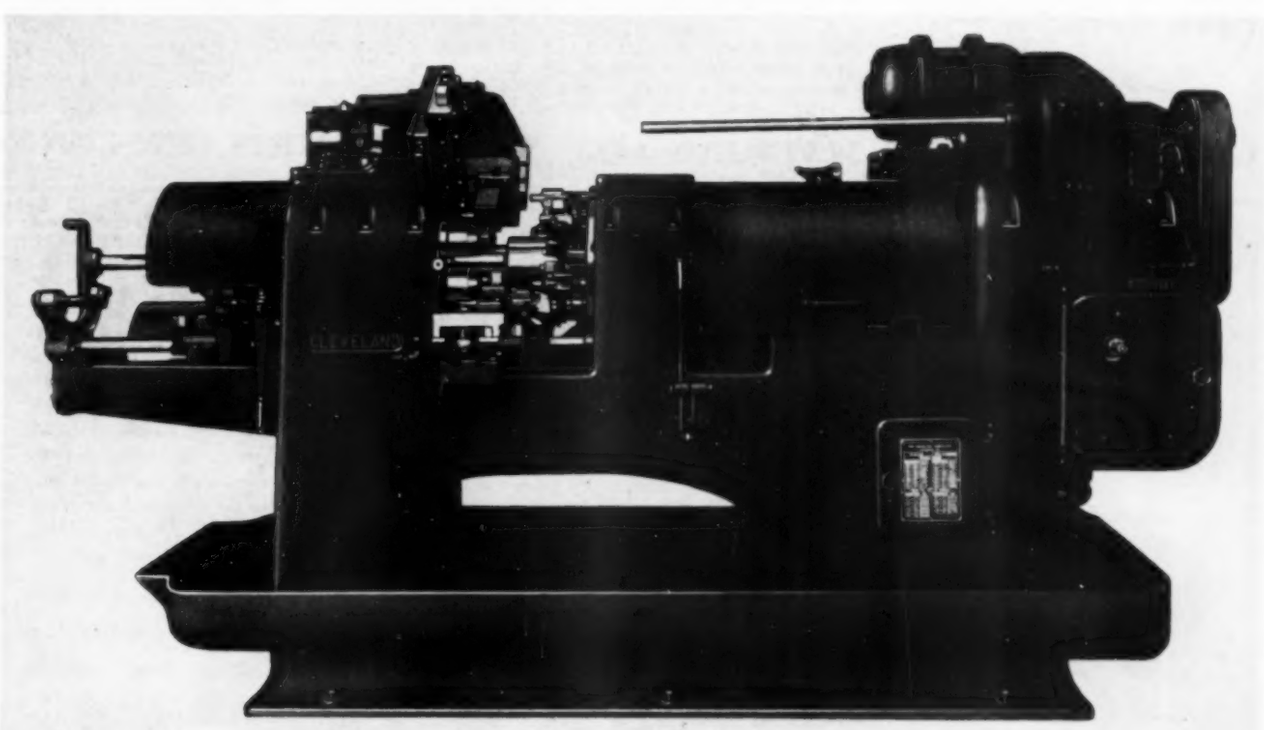
Why?

THE nickel alloy bed cast in one piece and cross ribbed with deep sections eliminates torsional strains maintaining the original alignment.

THE wide bearing surfaces cast integral in the bed absorb the thrust of the cutting tools insuring freedom from vibration or chatter under pressure of heavy tool cuts.

THE 8 or 12 tool positions made possible by the combination tool turret insures low initial tool cost by eliminating expensive tool combinations.

THE visible cam control and accessibility to tooling from the front or rear of the machine reduces down time to a minimum.



Model K 6-Spindle Machine

NATIONAL MACHINE TOOL EXPOSITION . . . BOOTH **No. 20**

THE CLEVELAND AUTOMATIC MACHINE COMPANY

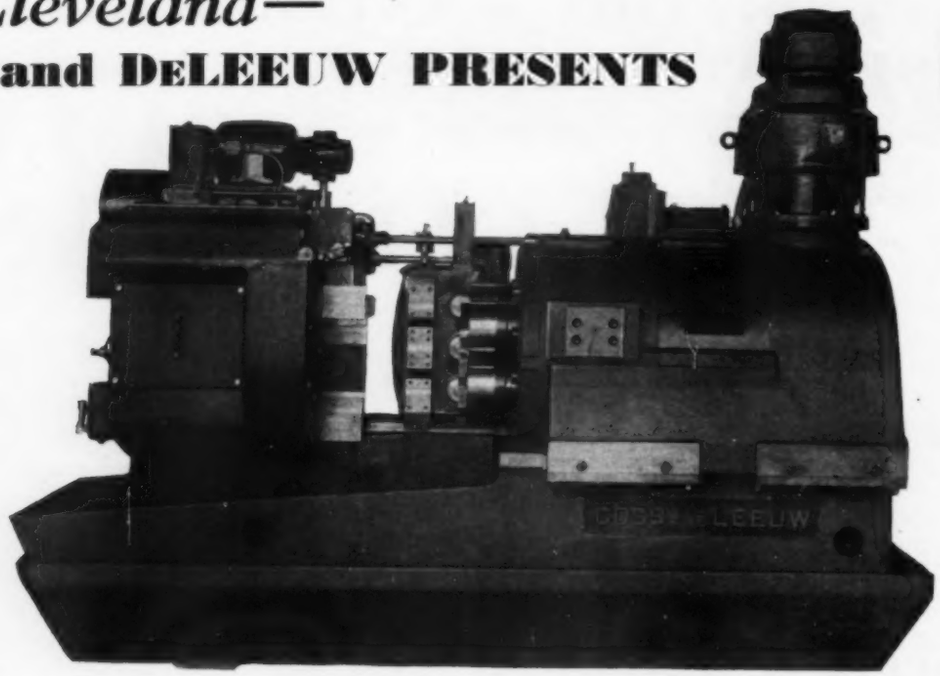
2269 Ashland Road, Cleveland, Ohio, U. S. A.

CHICAGO	NEW YORK	DETROIT
565 W. Washington St.	30 Church St.	2842 W. Grand Blvd.

At Cleveland—

GOSS and DeLEEUW PRESENTS

BOOTH 1008



NEW

WORK ROTATING CHUCKING MACHINE

A machine of durable and rigid construction for maximum production with accuracy, easy to set up, with adequate tool space, a large amount of chip room, with abundant coolant, built-in direct connected motors, a wide range of spindle speeds, a new spindle clutch construction, new cross slide construction, built-in electrical control, with electrically operated chucks.

GOSS & DeLEEUW MACHINE CO. - NEW BRITAIN, CONN.

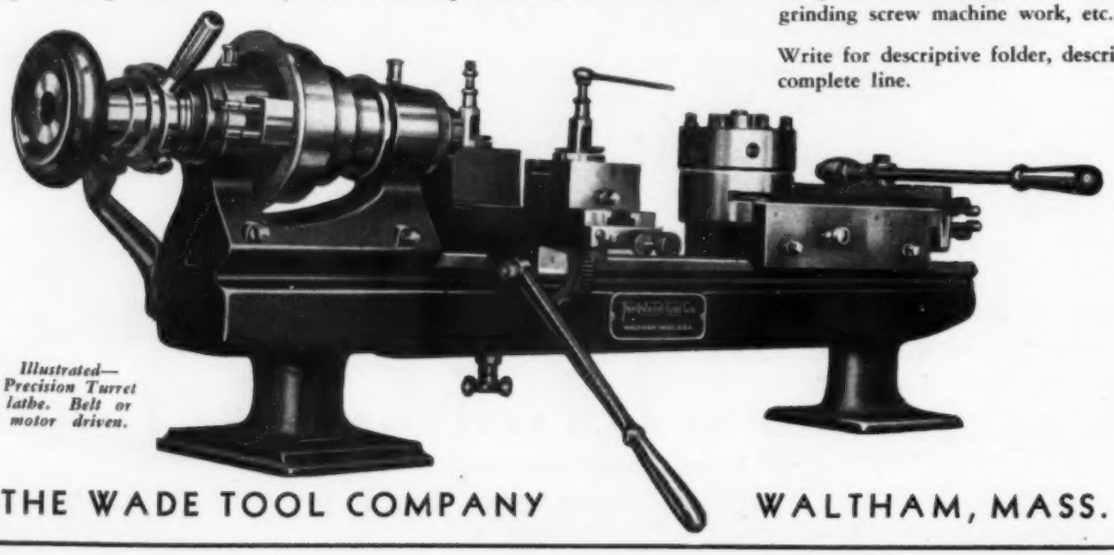
No. 1 in Accuracy

HIGH QUALITY PERFORMANCE with a MINIMUM OF OVERHEAD and OPERATING EXPENSES—has led to a choice of WADE PRECISION BENCH LATHES in many successful shops everywhere.

WADE PRECISION BENCH LATHES

WHERE the utmost in precision is an essential part of each day's work Wade Precision Bench Lathes are most appreciated. Proper design, sturdy construction, durable bearings, and perfect alignment assures accurate results through a long useful life. By the selection of proper attachments the Wade Bench Lathe can be used for quantity production. The combination shown above is a hand screw machine made by substituting a Turret for the Tailstock and a Double Cross Slide for the Compound Slide Rest. For instant action in gripping the stock a Lever Closer is fitted to the draw-in spindle. Any one or all of these attachments can be used or taken off and other attachments applied to suit the particular job. These lathes can be equipped for regular production milling, screw cutting, grinding screw machine work, etc.

Write for descriptive folder, describing complete line.

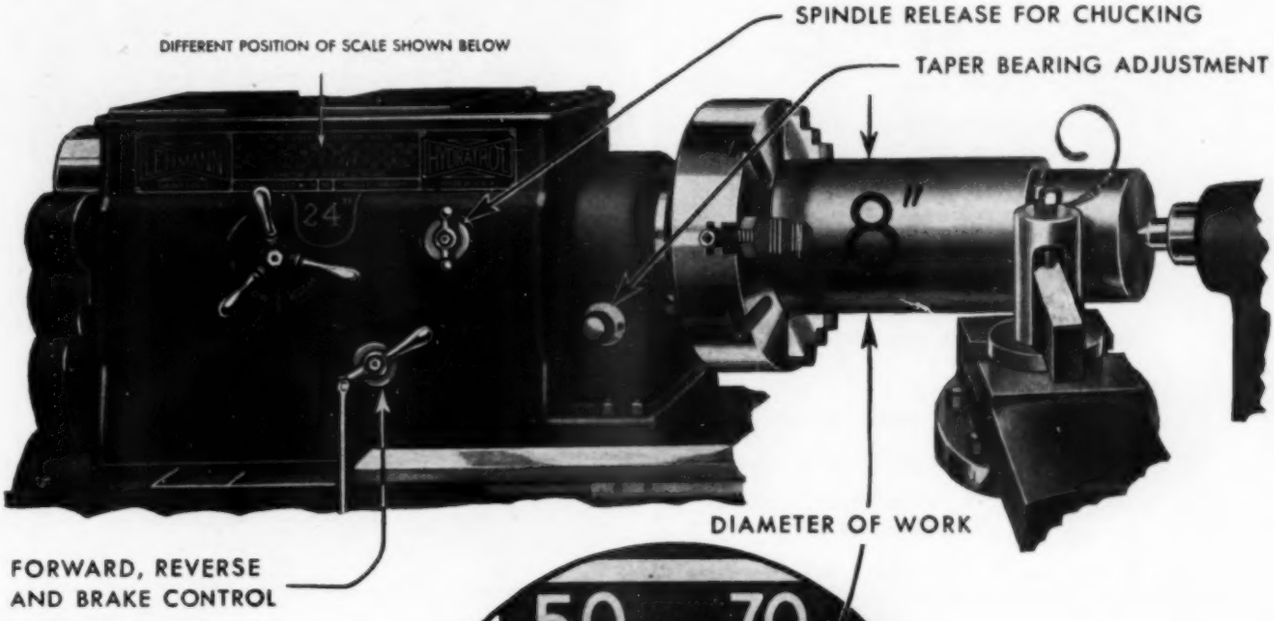


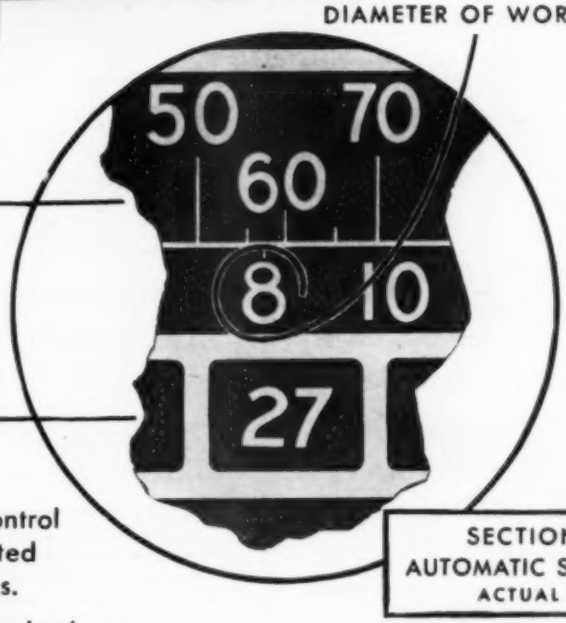
Illustrated—Precision Turret lathe. Belt or motor driven.

THE WADE TOOL COMPANY WALTHAM, MASS.

Presenting THE LEHMANN HYDRATROL

. . . the most outstanding development in lathe design since the advent of the geared head and quick change gears


DIFFERENT POSITION OF SCALE SHOWN BELOW
SPINDLE RELEASE FOR CHUCKING
TAPER BEARING ADJUSTMENT
DIAMETER OF WORK
FORWARD, REVERSE AND BRAKE CONTROL



Slide Rule automatically co-ordinates with selector control indicating spindle speeds and cutting speeds in feet per minute.

One handle speed selector control through hydraulically operated friction and positive clutches.

Forward and reverse–hydraulic brakes.

Automatic relay prevents clash of clutches.

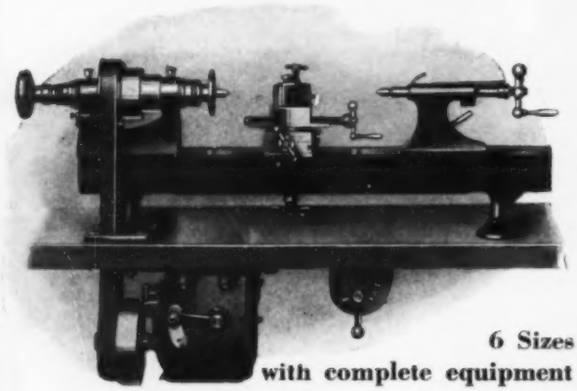
Send for literature describing the features of the HYDRATROL and other important developments in Lehmann Lathes.

LEHMANN MACHINE COMPANY
ST. LOUIS, U. S. A.

"Stark"

Precision LATHES *and* MILLING MACHINES

Master Tools since 1862



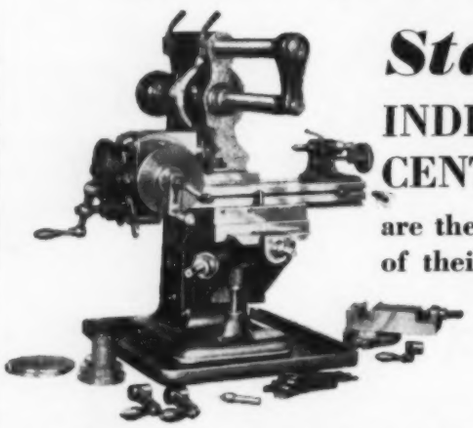
6 Sizes
with complete equipment

STARK MOTOR DRIVE UNIT Series B
9 speeds, silent, vibrationless, reliable

Write about this new improved mechanism

Spring Bind Heads • Lever Chuck Closers
for fast and very accurate Man'f'g

Collets • Chucks • Diamond and Sensitive Upright Drills • Special Tools



***Stark* INDEX CENTERS**
are the finest of their kind

Plain and Spiral Bench Milling Machines
Swings 6", Table 18", Collet Capacity ¾". Stark Spindle, with 3° and 45° tool steel hardened, ground and lapped bearings both front and rear, create with rare craftsmanship, the most accurate miller known. It maintains this remarkable accuracy.

STARK "ELECTROBLAST"
High Speed Muffle Furnaces with powerful Torch used separately as a very handy portable flame. Muffle 7"x 3⅛"x2⅛". Furnace $35. Torch $35. Write for Bulletin K.

STARK TOOL COMPANY
Waltham, Mass.
Originators of the American Bench Lathe

THIS NEW
LIGHT
INCREASES MACHINE OUTPUT
Eliminating glare and reducing eye strain by the properly engineered, easily directed, high intensity illumination of the Fostoria Machine Lamp, insures increased production, less spoilage and few accidents .... In one plant, savings by increased production alone, paid the complete cost of new equipment in 90 days. In another, output of machines was increased 21% .... A study of your requirements will be made by a Fostoria representative — no obligation.
The Fostoria Pressed Steel Corporation
Ind. Div. Fostoria, O.
MACHINE
fostoria
LAMP
POINTS ANYWHERE
FRONT
REAR
SIDES
UP
DOWN

P&J SEE THE P&J

LATEST MODEL P&J
AUTOMATICS IN FULL OPERATION
AT BOOTH 602 MACHINE TOOL SHOW
CLEVELAND, OHIO, SEPT. 11th TO 21st

POTTER & JOHNSTON MACHINE CO.
PAWTUCKET, R. I.

For screw machine economy, accuracy and big output

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CONE AUTOMATIC MACHINE CO.
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CONE AUTOMATICS

Important Improvements in

DAVIS KEYSEATERS

Illustration shows typical set up for cutting taper keyways with table tilted.

Tie with Today's Movement
TOWARD MODERNIZATION

The cutter is set up in vertical position and remains vertical during the entire cutting process. The resistance arm back of cutter is adjustable to accommodate cutters of different widths or depths, and work of various heights.

The feed is table type, operated by hand lever in connection with pinion, meshing with rack attached to table. A graduated collar on feed shaft indicates depth of cut.

For cutting taper keyways the table may be inclined in either direction from horizontal, and a scale is provided to indicate the exact taper per foot for which it is set.

This is a very important improvement over our older machines in which the table was stationary.

The table is slidably mounted on accurately machined ways with a gib to take up wear.

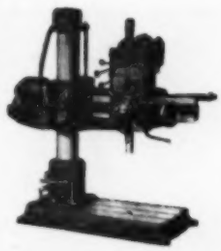
Machines are made in three sizes for keyways 1/16" to 1½". in width.

Write us for new descriptive bulletins and detailed specifications.

DAVIS KEYSEATER COMPANY

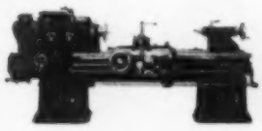
403 Exchange St., Rochester, N. Y.

DRESES RADIAL DRILLS



Also Monitor Brass Lathes. Multi-duty radials, heavy duty — accurate — compact. Sizes 3 to 8 feet inclusive. Manufactured by The Dreses Machine Tool Company.

BOYE & EMMES LATHES



Fine lathes for 40 years. Medium and heavy duty types. 14" to 36" swings. Manufactured by The Boye & Emmes Machine Tool Co.

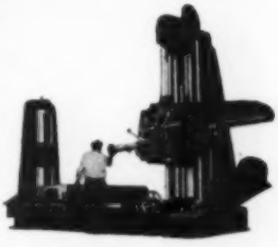
KLING GRINDERS

Also structural fabricating machinery. Heavy duty built in a full range of sizes. Manufactured by Kling Bros. Engineering Works.

CLEEREMAN DRILLING MACHINES

Fully geared—automatically oiled—full anti-friction drills. Standard sizes 21" to 28". Manufactured by Cleereman Machine Tool Company.

OHIO SHAPERS & BORING MILLS



Ohio Dreadnaught Shapers 16" to 36" sizes. Horizontal Boring Mills all types—4", 5" and 6" spindles. Manufactured by The Ohio Machine Tool Company.

For descriptive literature and complete information on any of the above machines, write

General Distributors

BRYANT MACHINERY & ENGINEERING COMPANY

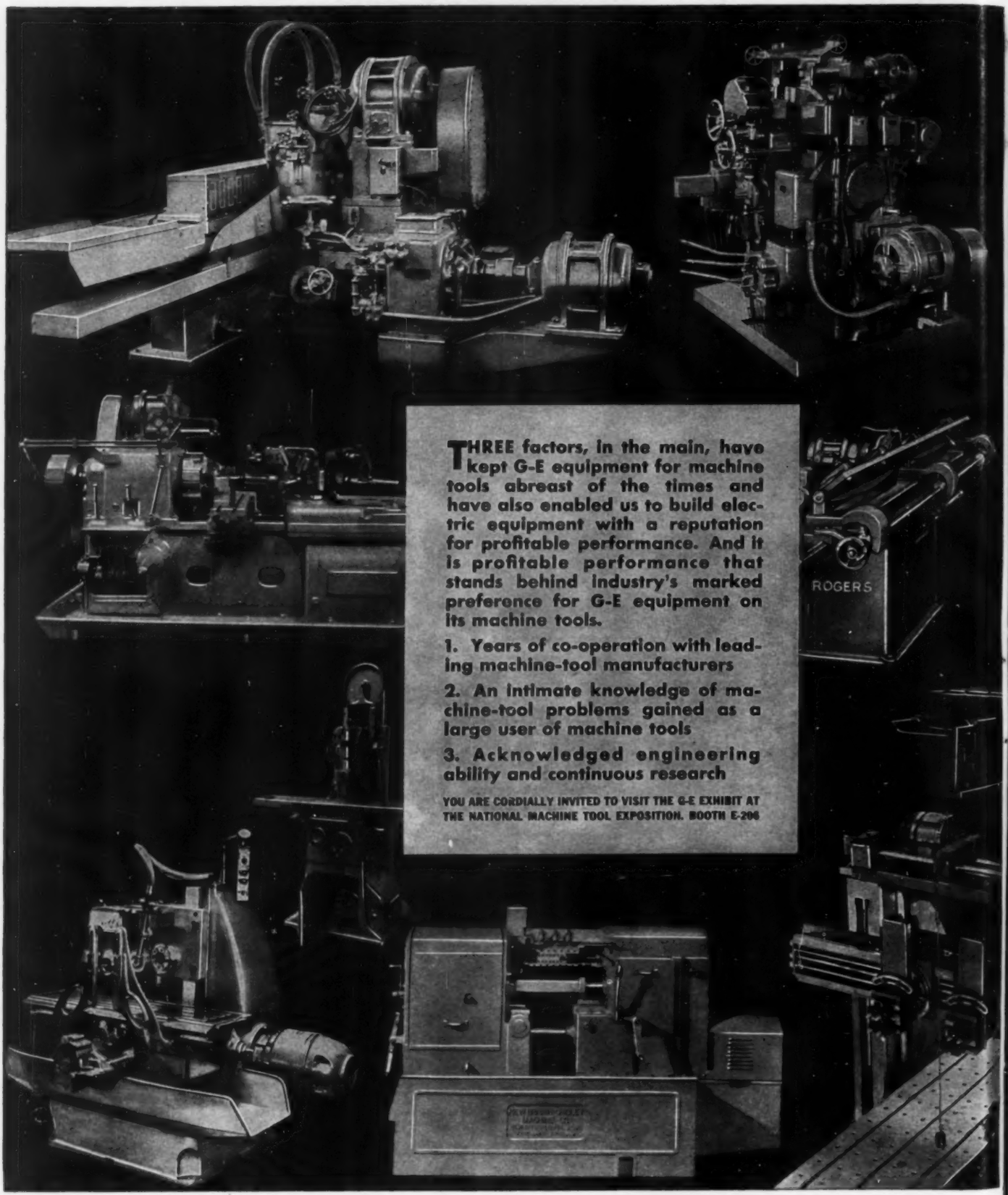
MACHINE TOOLS - WELDING EQUIPMENT - GENERAL METAL WORKING MACHINERY

THE CHICAGO DAILY NEWS BUILDING
400 WEST MADISON STREET

• CHICAGO •

REPRESENTATION IN PRINCIPAL CITIES

IN STEP WITH MODERN MACHINE



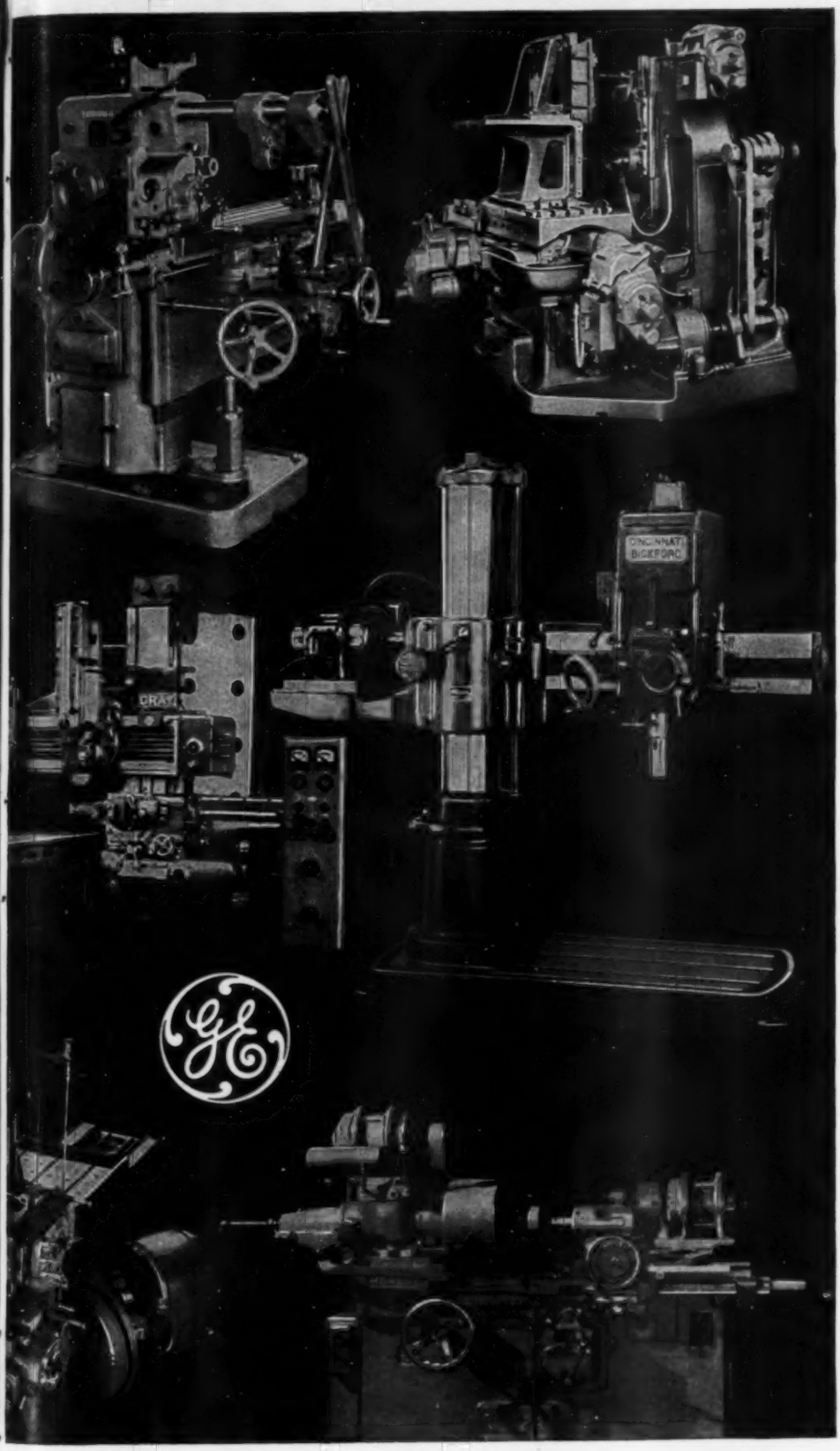
THREE factors, in the main, have kept G-E equipment for machine tools abreast of the times and have also enabled us to build electric equipment with a reputation for profitable performance. And it is profitable performance that stands behind industry's marked preference for G-E equipment on its machine tools.

1. Years of co-operation with leading machine-tool manufacturers
2. An intimate knowledge of machine-tool problems gained as a large user of machine tools
3. Acknowledged engineering ability and continuous research

YOU ARE CORDIALLY INVITED TO VISIT THE G-E EXHIBIT AT THE NATIONAL MACHINE TOOL EXPOSITION. BOOTH E-206

G E N E R A L

TOOL DESIGN ★ ★ ★ ★ ★



THESE MANUFACTURERS WILL HAVE G-E EQUIPPED MACHINES AT THE SHOW

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E-315	The V & O Press Co.
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	ARENA
A-209	The Leon J. Barrett Co.
A-301	The Producto Machine Co.

011-73

ELECTRIC

This NEW . . .

Coulter Automatics

DIAMOND TOOL BORING MACHINE

of the vertical six-station revolving turret type is designed for the large quantity machining of the bearing holes in

Connecting Rods
Pistons
Bushings
Valves
Refrigerator Units
Motor End Shields
Magneto Housings

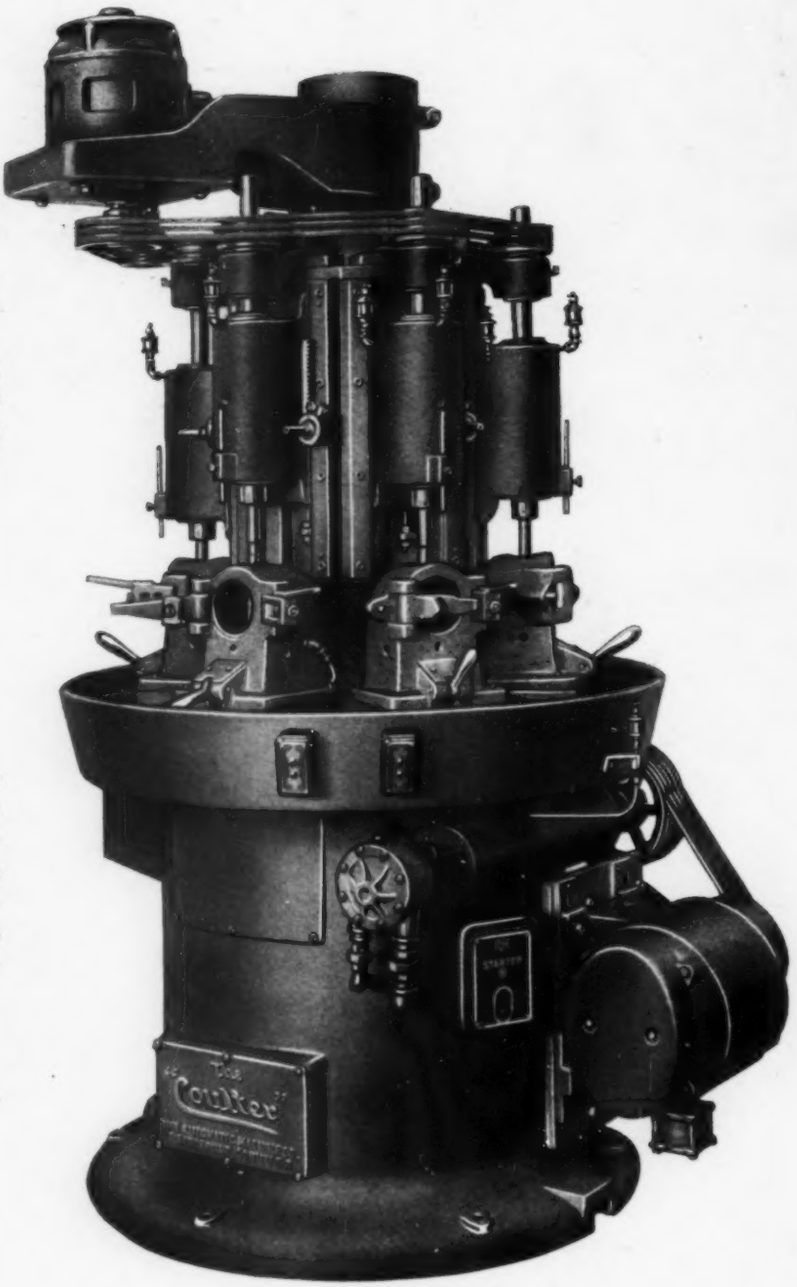
and similar parts.

The machine shown is fitted for the diamond boring of the wrist pin holes in pistons and the fixtures are of the manually operated type equipped with locators, clamps and ejectors. The operator loads and unloads as the fixtures come in turn to the idle spindle position at the front of the machine.

Production is 9 pistons per minute.

Meets all the present day requirements of

Extreme Accuracy
High production
Low cost of product.



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THE AUTOMATIC MACHINE COMPANY

BRIDGEPORT, CONN., U. S. A.

SALES REPRESENTATIVES

Strong, Carlisle & Hammond Co.—Detroit
Federal Machinery Sales Co.—Chicago

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Each Bar . . . . .

INDIVIDUALLY COLD TREATED UNDER ACCURATE CONTROL

● Individual cold treatment of steel bars at the Union Drawn Mills develops radical improvements in their characteristics and offers the widest latitude for selective processing. It permits accurate control of each unit in production and promotes the most dependable practice of inspection. Methods of processing each order are carefully recorded so that identical operations may be performed on future duplicate requirements. The highest uniformity is therefore attained, bar after bar and shipment after shipment.

Union Cold Drawn Steel is steel refined for cost saving and quality improving purposes. Bars are true to required analysis and physical properties, accurate to size and shape, surfaced to the smoothness of a machined finish and carefully straightened. Their working strength has been increased by 70% to 100% and their machinability improved by 15% to 25%. They are ready for production into steel parts with a minimum of machining and the greatest assurance of accurate qualities in the finished work.

It is because of these exceptional features that Union Cold Drawn Carbon and Alloy Steels are so widely used in place of other metals and of steels in other forms.

COLD DRAWING
PROVIDES
MAXIMUM MACHINABILITY

UNION DRAWN STEEL CO. MASSILLON, OHIO

SUBSIDIARY OF
REPUBLIC STEEL CORPORATION

Union Cold Drawn ALLOY STEELS

• These bars have filled special needs for product improvement since the days when alloy steels were first introduced. Today, they are widely used for parts requiring exceptional strength and toughness or high resistance to shock or fatigue in combination with reduced size and weight.

Union Drawn's scientific cold treatments produce these steels in their most economical form. Bars are accurate to size and cross section, are surfaced to machined smoothness and are processed by advanced methods to produce better machining qualities. They are true to analysis, individually processed and carefully inspected — ready to be manufactured into parts with the minimum of operations.

The choice of alloy steels depends upon the nature of the part to be made and the requirements of its application. Our extensive experience with such questions enables us to analyze your needs and give sound recommendations on the proper grade and treatment for the most economical program. Union Drawn's Field Metallurgical Staff has made notable contributions to industry in that direction.

OPEN HEARTH OR ELECTRIC FURNACE

Manganese Steels
Nickel Steels
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Chromium-Molybdenum Steels
Nickel-Molybdenum Steels
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Chromium Steels
Chromium-Vanadium Steels
Tungsten Steels
Silicon-Manganese Steels
Enduro Stainless Steels

UNION DRAWN STEEL CO. MASSILLON, OHIO

SUBSIDIARY OF
REPUBLIC STEEL CORPORATION

IN THE HEART OF THE ALLOY STEEL INDUSTRY

New!

for your profit

~ The 1935 "WHITNEY" HAND MILLER

● Nichols has brought to this Hand Miller the finest workmanship and accuracy.

The improvements in design, in construction, in productivity, of the 1935 "Whitney" miller were made for one reason—to permit you to increase your profit.

You have in the 1935 "Whitney" miller a machine of simple, rugged construction with ample power. A modern machine adapted to a wide variety of milling operations on small work—large or small lots.

The accuracy, ease and quickness of set up makes it ideal for tool room work yet does not limit it to any one class of production. The 1935 "Whitney" has also proved its adaptability to production work by reducing time and costs on large lots.

The 1935 "Whitney" fills a distinct need for the accurate milling of small pieces at costs far below those on heavier equipment.

Write for Descriptive Bulletin and Prices.

SPECIFICATIONS IN BRIEF

- Longitudinal feed 10″.
- Transverse feed 7″.
- Vertical feed of knee 13½″.
- Vertical movement of head 4½″.
- Hardened and ground spindle.
- Spindle bearings Timken taper.
- Spindle nose new milling machine standard taper 3½″ to the foot.
- Spindle speeds—100, 200, 650, 1200 rpm.

Manufactured by

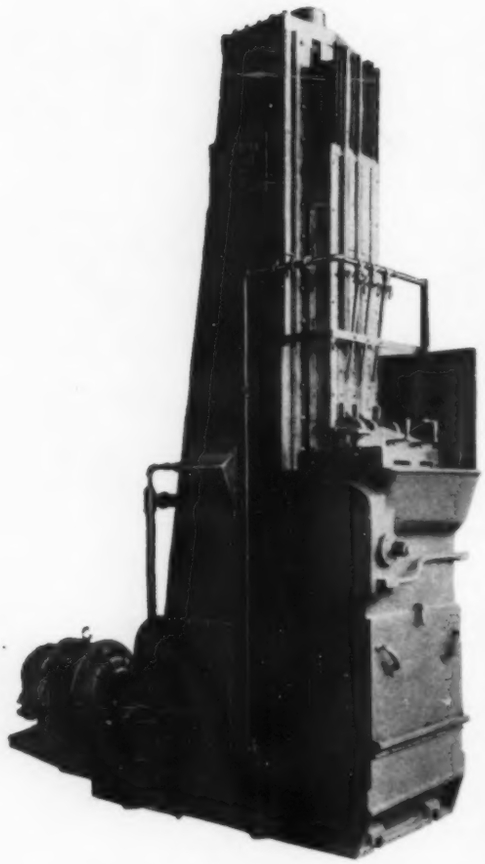
W·H· NICHOLS ··WALTHAM·MASS·

PRODUCTION...
from 2 to 10 times greater

with

AMERICAN

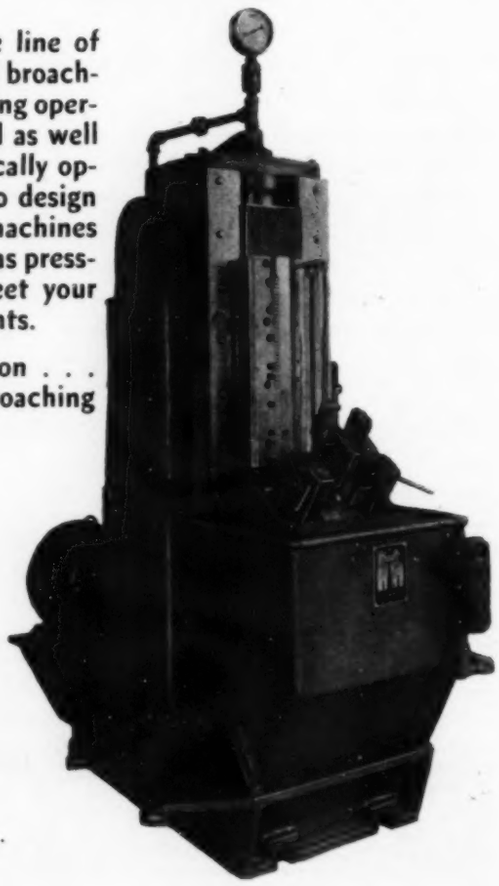
full automatic and semi-automatic
VERTICAL, HYDRAULIC, INTERNAL and SURFACE
BROACHING MACHINES



Machines arranged for semi-automatic or full-automatic cycle, and supplied with fan-shaped, sliding or tilting type automatic fixtures. Our machines are massive, with features that have been proved out in the last ten years for high production. Some plants have as many as 200 in operation.

American Broaching Machines, Backed by a firm-personnel with 33 years of Broach Development

We have a complete line of machines for internal broaching or surface broaching operations, of the vertical as well as horizonal hydraulically operated type. We also design and build special machines for broaching as well as pressing operations to meet your particular requirements.



If you are interested in cost-cutting and increased production . . . the one outstanding firm which has pioneered in so many broaching improvements is at your service.

✓ NOTE: See us at the Cleveland Machine Tool Show
BOOTH 1005

American Broach & Machine Co.

ANN ARBOR, MICHIGAN
F. J. LAPOINT, President

NILES

MACHINE

TOOLS

★

THE NILES TOOL WORKS CO.
DIVISION
GENERAL MACHINERY CORPORATION
HAMILTON, OHIO

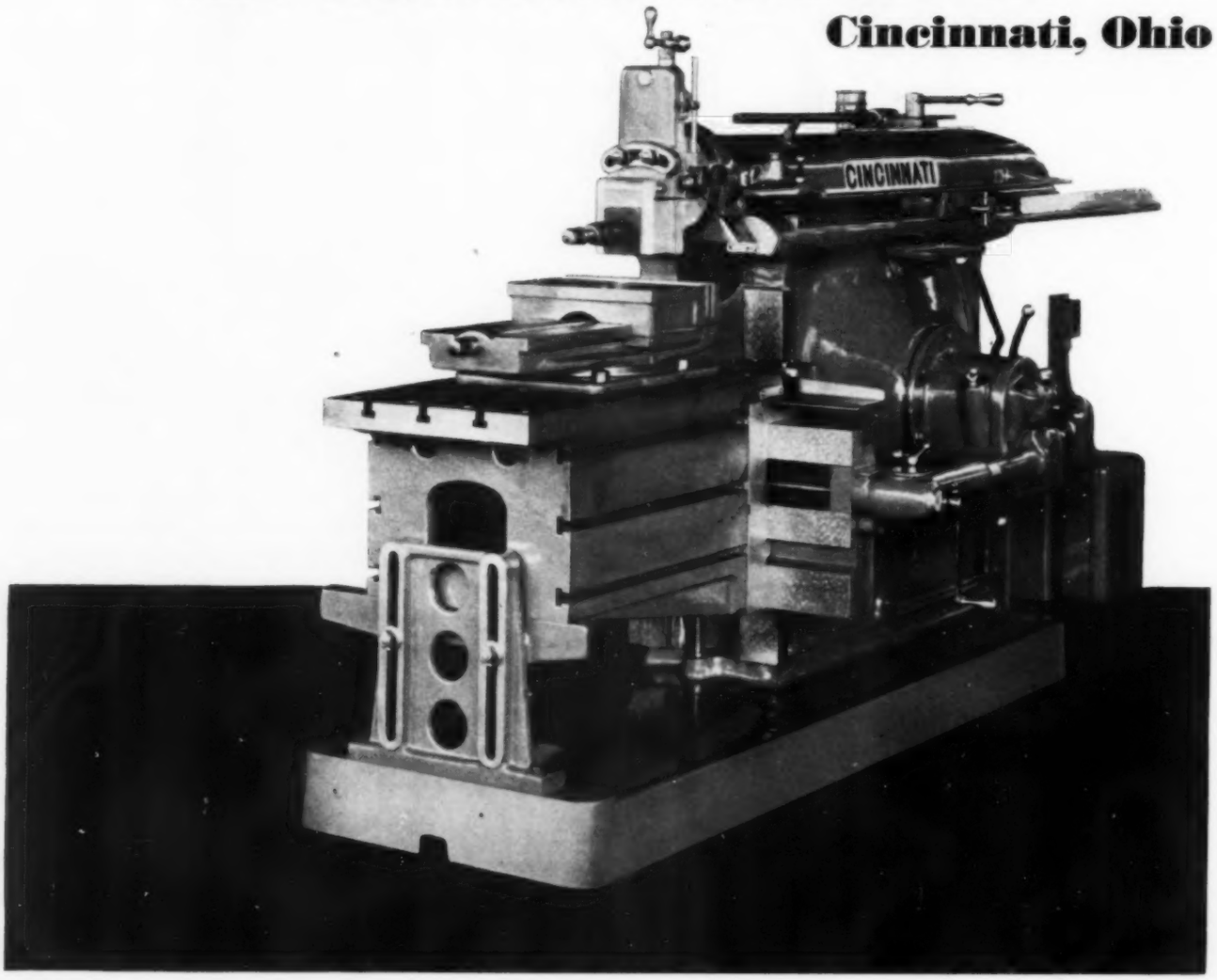
Make your Shop a SHOW ROOM

DON'T regard the unusual performance of Cincinnati Shapers and Cincinnati Shears at Cleveland as an exhibition.

The same service . . . the same efficiency . . . the same satisfaction . . . the same admiration for these modern tools can be transferred to your own shop. You can turn the show machines into profits. Install a Cincinnati.

THE CINCINNATI SHAPER CO.

Cincinnati, Ohio



The Oliver Instrument Company
[OLIVER OF ADRIAN]

extends a cordial invitation to you
to visit them at

Booth No. 208

Machine Tool Show, Cleveland, Ohio
September Eleventh to Twenty-first
They will have on exhibition

A New Full Automatic Face Mill Grinder
A New No. 21 Bench Model Twist Drill Grinder
A New Universal Hone and Cutter Grinder

*

Also the following standard machines; No. 51 Twist Drill Grinder, SP-2 Die Making Machine, No. 2 Arc Face Mill Grinder, Tap Grinder, Drill Point Thinner and the Heavy-duty Die Making Machine for 3" materials.

Plan to spend some time with us—you are sure to find many things of interest

*

OLIVER INSTRUMENT COMPANY • 1414 E. MAUMEE STREET • ADRIAN • MICHIGAN

Here it is!

At the MACHINE TOOL SHOW

CLEVELAND BOOTH A-205

PATENT APPLIED FOR

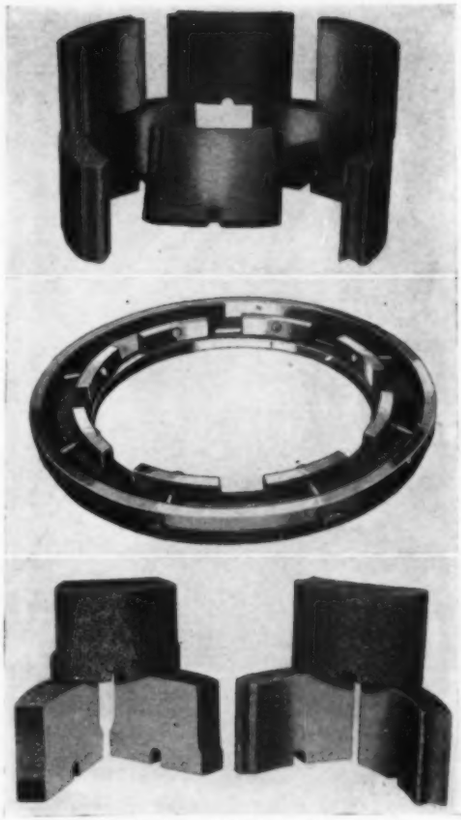
STERLING ABRASIVES

THE NEW STERLING
Segmental Wheel and Chuck

IN this new STERLING chuck and segmental wheel we have combined the experience and knowledge gained in years of making chucks for STERLING segmental grinding wheels. The STERLING chuck has always been of light weight and easy on the bearings of your grinders and we now offer a chuck still lighter than our standard chuck and with several added features for efficiency and economy.

With the new chuck each segment is mounted separately, the grooved segment fitting itself into its proper position and with a twist of the socket wrench each segment is tightened and remains solid throughout its life. A full set of segments can be set up in but a few moments and is so simple a child can do it. After wearing down the segments they can be set out and still more life obtained leaving but a fraction of an inch to be discarded.

This is a real production unit, built for production surface grinding with solid or gap type segments or solid ring wheels without the fuss and time consumed in sulphuring. Let our Engineers show you what a Sterling chuck and segmental wheel can do to reduce your grinding costs.



PATENT APPLIED FOR

Designed for

PRATT & WHITNEY
BLANCHARD · DIAMOND
OSTERHOLM
CAPITAL KNIFE GRINDERS

THE STERLING GRINDING WHEEL COMPANY

Abrasive Division of The Cleveland Quarries Co

Factory and Office: TIFFIN, OHIO CHICAGO: 133 N. Wacker Drive DETROIT: 101-107 W. Warren Ave.

STERLING ABRASIVES

PIONEERING BEYOND INDUSTRY'S HORIZON

The Carborundum Company realizes its responsibility to the machine tool industry

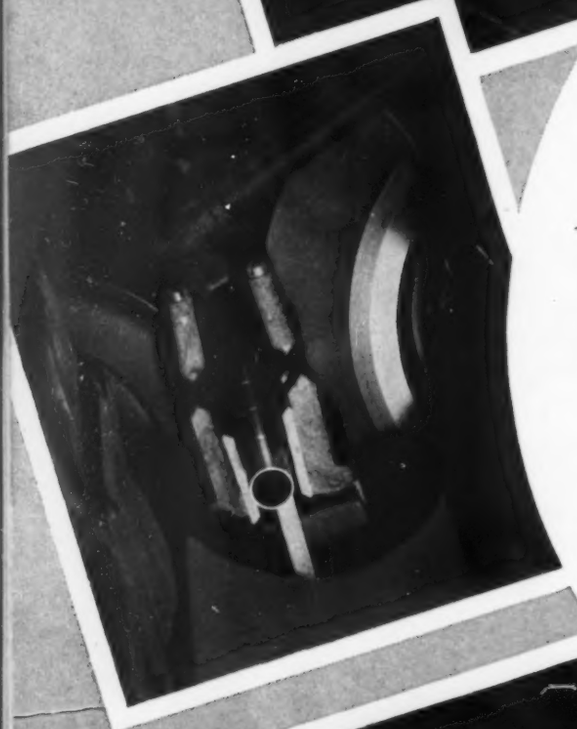
THE constant aim of the organization is to develop and investigate new abrasive materials—new combinations of bond and abrasive—to set new precedents for productive performance. This is termed Research.

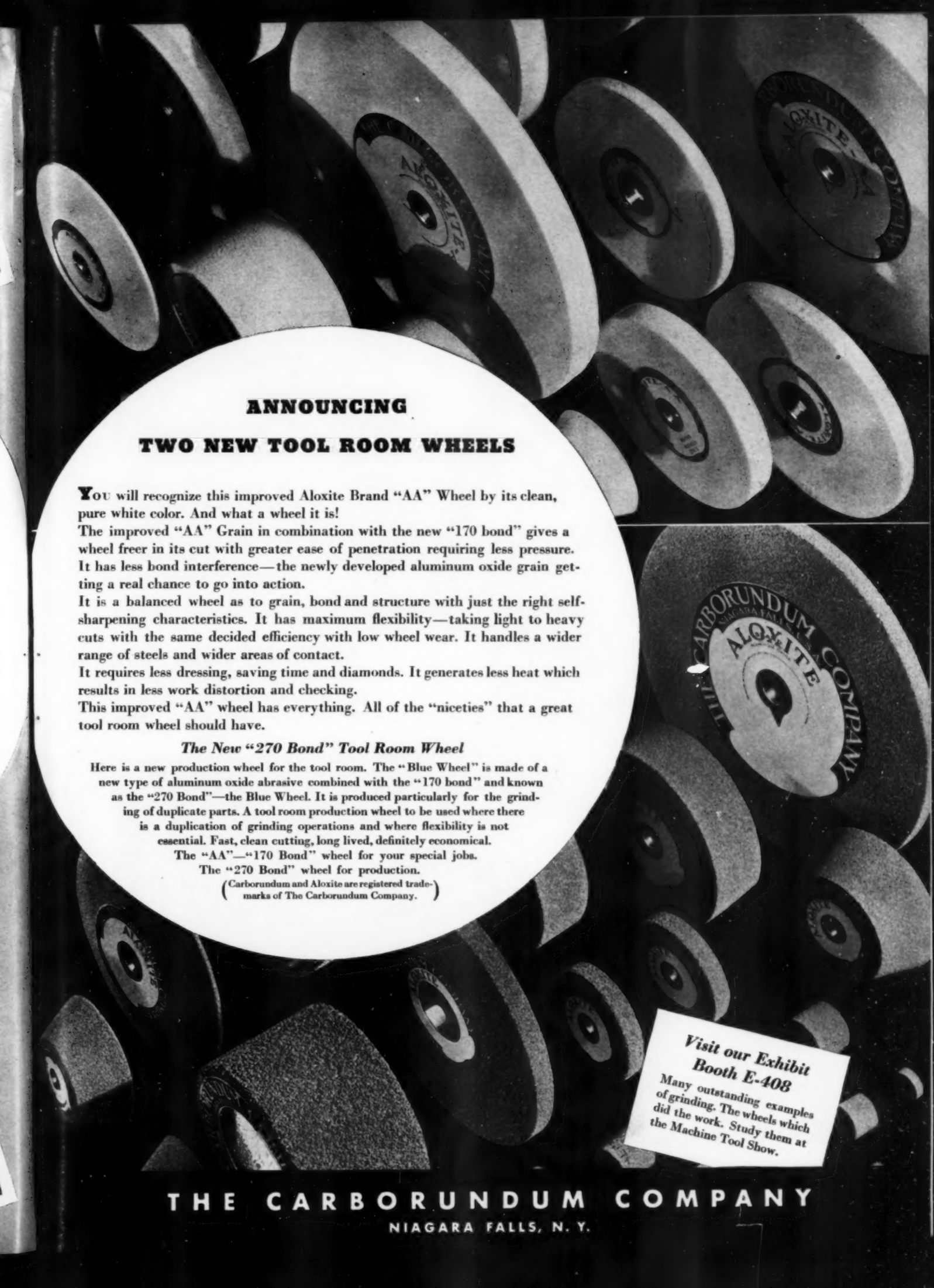
A new grinding machine, a new steel, iron or alloy is produced—new tools and parts come into being over night—their introduction presents new grinding problems calling for a new series of grinding wheels—a new grinding technique.

Carborundum must be ready ahead of time.

Carborundum engineering service must put the right wheel in the right place for every grinding job from hair split precision of centerless, cylindrical, internal and tool room work to the heavy snagging jobs of the foundry.

Carborundum engineering facilities are available to the machine tool builder, the metallurgist—to all who are pioneering beyond present horizons.





ANNOUNCING

TWO NEW TOOL ROOM WHEELS

You will recognize this improved Aloxite Brand "AA" Wheel by its clean, pure white color. And what a wheel it is!

The improved "AA" Grain in combination with the new "170 bond" gives a wheel freer in its cut with greater ease of penetration requiring less pressure. It has less bond interference—the newly developed aluminum oxide grain getting a real chance to go into action.

It is a balanced wheel as to grain, bond and structure with just the right self-sharpening characteristics. It has maximum flexibility—taking light to heavy cuts with the same decided efficiency with low wheel wear. It handles a wider range of steels and wider areas of contact.

It requires less dressing, saving time and diamonds. It generates less heat which results in less work distortion and checking.

This improved "AA" wheel has everything. All of the "niceties" that a great tool room wheel should have.

The New "270 Bond" Tool Room Wheel

Here is a new production wheel for the tool room. The "Blue Wheel" is made of a new type of aluminum oxide abrasive combined with the "170 bond" and known as the "270 Bond"—the Blue Wheel. It is produced particularly for the grinding of duplicate parts. A tool room production wheel to be used where there is a duplication of grinding operations and where flexibility is not essential. Fast, clean cutting, long lived, definitely economical.

The "AA"—"170 Bond" wheel for your special jobs.

The "270 Bond" wheel for production.

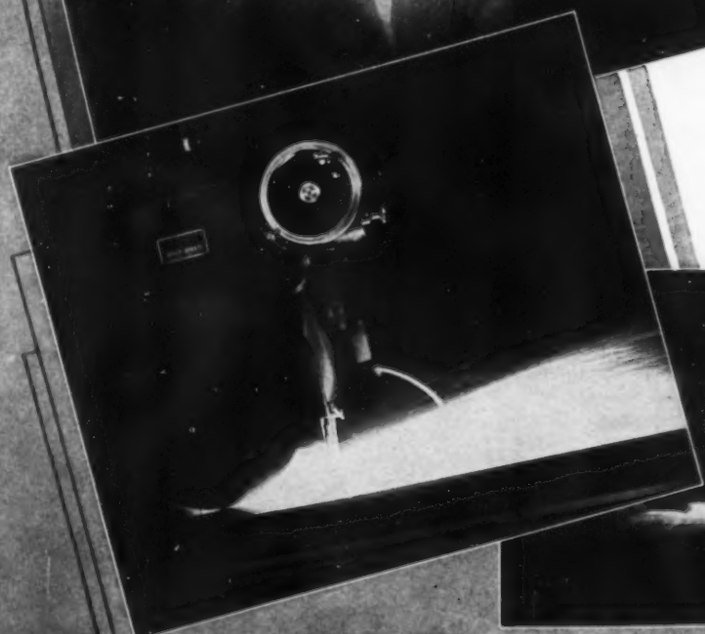
(Carborundum and Aloxite are registered trademarks of The Carborundum Company.)

Visit our Exhibit Booth E-408

Many outstanding examples of grinding. The wheels which did the work. Study them at the Machine Tool Show.

THE CARBORUNDUM COMPANY

NIAGARA FALLS, N. Y.



REGARDLESS

. . . of what your grinding operation may be, there is a Macklin Wheel that will do the job

. . . Easily

. . . Efficiently

. . . Economically

•

MACKLIN COMPANY

Manufacturers of Grinding Wheels

Jackson, Michigan, U. S. A.

Sales Offices—Chicago, New York, Detroit, Pittsburgh, Cleveland, Cincinnati, Milwaukee

MACKLIN

NEW

Showing at Cleveland, first time anywhere—The New Blanchard No. 18 Surface Grinder, with numerous features that make for swifter, easier operation—better production—bigger profits.

MAKE A NOTE TO SEE IT

BLANCHARD

THE BLANCHARD MACHINE COMPANY

64 STATE STREET · CAMBRIDGE · MASS.

o d a y i t ' s

HOMPSON

The new Thompson 12″ x 16″ x 60″ Hydraulic Surface Grinding Machine has all the flexibility and speed of the smaller models, in addition to a greater range with a 20″ diameter by 2″ face wheel. Control is simplified and grouped on the operating panel, obviating the necessity for the operator to study the manipulation of complex levers and valves.

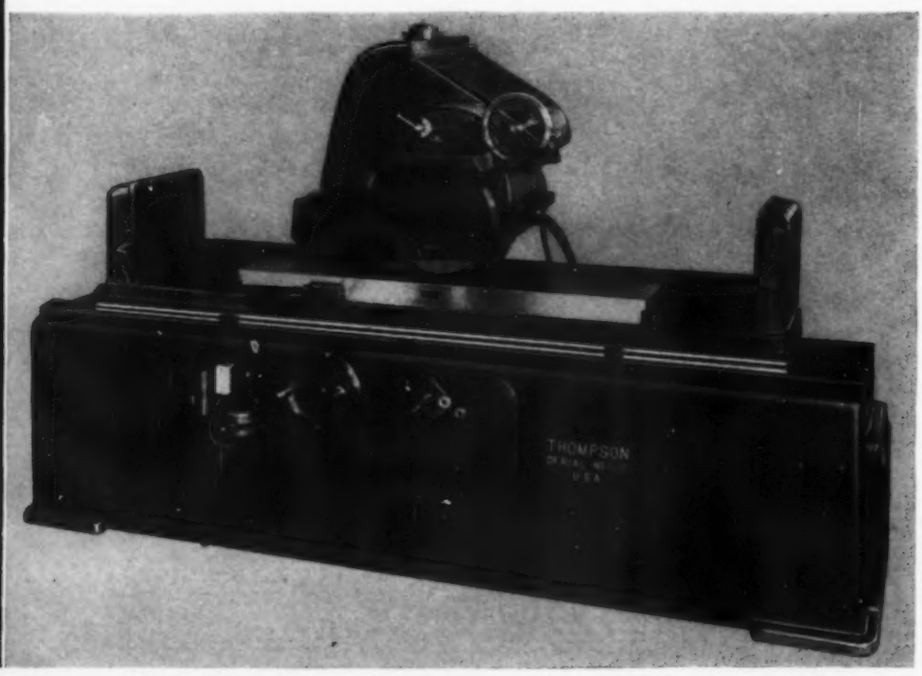
A study of the features of this line of grinding machines will point the way to lower grinding cost in your plant.

- Hydraulic wheel head feed
- Hydraulic wheel truing
- Hydraulic wheel head rapid traverse
- Precision motorized spindle (Standard shaftless motors)
- Hydraulic table feed 10 to 90 f.p.m.
- Pressure feed oiling (filtered)

THE THOMPSON GRINDER COMPANY, Springfield, Ohio, U. S. A.

SEE US AT THE SHOW • • •

BOOTH NO. 24



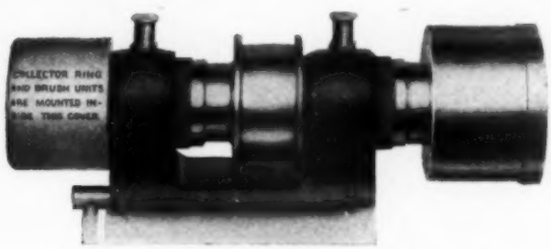
Send for New Catalog G 4

Booth No. 3

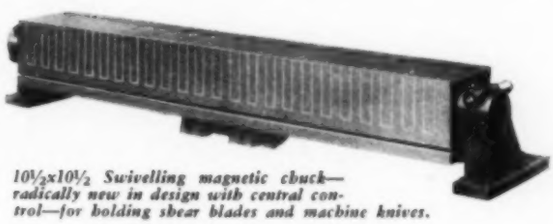
See a CONVINCING DEMONSTRATION of how set-up time can be turned into production time

No. 618 all steel magnetic chuck. This type available in sizes ranging from 4"x8" up to 20"x96".

No. 617 bar pole magnetic chuck. This type specially suitable for holding small and thin work.



Collector ring and brush unit mounted on rear end of machine spindle. Available for all sizes of rotary magnetic chucks.



10½x10½ Swivelling magnetic chuck—radically new in design with central control—for holding shear blades and machine knives.

Put all your machine tools ON FULL TIME WORK

The Cleveland Show will offer you an outstanding opportunity to see how you can save from 20 to 50% in chucking labor, through elimination of slow acting jigs and fixtures and reduce spoilage losses with Walker Magnetic Chucks.

Study the complete Walker line which makes these savings available for metal removing operations on lathes, shapers, drill presses, planers, grinders, etc. by turning set-up time into production time. Then ask our engineers to give you an idea of how much you can save in your toolroom and on your production line.

Make Surface Grinding Profitable ON A WIDE RANGE OF WORK

The Walker Model D-B Single Stroke Surface Grinder features ample power, rigidity and accuracy. It is a cost cutter in high production, and because of the quick adjustments provided, will handle a wide range of work economically. Set-up time is reduced to a minimum through the use of the Walker Rotary Magnetic Chuck.

Our engineers will gladly put the Walker Surface Grinding Machine through its paces for you at the Machine Tool Exposition.

O. S. WALKER CO., Inc.
WORCESTER
MASS. U. S. A.

Assuring high accuracy automatically in MILLING CUTTER GRINDING

This easily operated precision MILLING CUTTER GRINDER is entirely automatic, and one unskilled operator can attend to several machines.

The main application of this new machine is in grinding the face, side and chamfered edge of plain and inserted tooth milling cutters, especially tungsten carbide tipped tools. The unique indexing method finishes the tools with perfect accuracy and concentricity, even with inaccurately spaced blades in the cutters.

This machine can also be used for grinding spiral fluted cutters, turning and planing tools, made of alloy steel or tungsten carbide. This machine, made in two sizes for cutters of 4—28 in. dia., is already widely used by the most important European tool shops and offers a practical answer to the problem of accurate, low cost tool grinding. Write for details.

COLLET & ENGELHARD

Machine Tool Builders Since 1862

OFFENBACH-MAIN. Germany

U. S. and Canadian Agents:
W. A. SCHUYLER, Fisk Bldg., New York, N. Y.

AMERICAN No. 2
Automatic Surface Grinder

Designed to meet the need for a modern, accurate, flexible, fast, automatic grinder for use in grinding and finishing dies, punches, gauges and work of similar nature.

All working parts readily accessible with control levers conveniently located. Rigidly constructed for long life with minimum attention. All adjustments made quickly and easily.

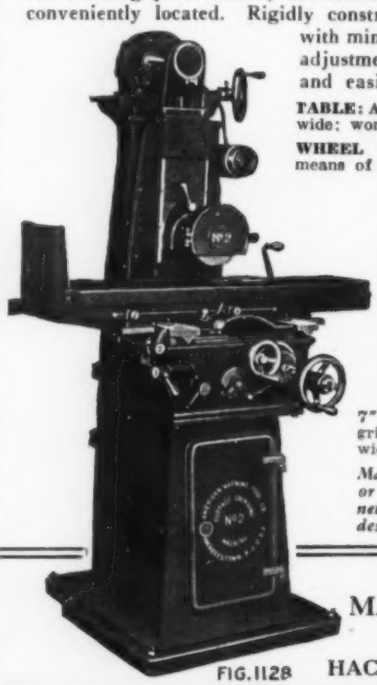


FIG. 1128

TABLE: Automatic—46" long, 8" wide; working surface 18"x6".

WHEEL ADJUSTMENT: By means of hand wheel graduated to .00025 in. Side grinding down to .001 in.

SPINDLE: Hardened ground and lapped, running in tapered split-type phosphor bronze bearings.

SPINDLE HOUSING: Locked in position by lever actuated cam.

CAPACITY: Using a 7" diam. wheel, will grind work 18" long, 6" wide and 9" high.

May be used either wet or dry grinding. Magnetic chucks available if desired.

AMERICAN MACHINE TOOL COMPANY
HACKETTSTOWN, N. J.

Precision
METAL MARKING

The No. 4 General Purpose Hand Operated Marking Machine illustrated, marks flat or round parts of various shapes and sizes, speedily and precisely. We also manufacture a General Purpose Power Operated Machine, as well as a full line of Single Purpose Rapid Production Marking Machines, and Numbering Heads, Steel Stamps—in fact, marking devices for every purpose. Write for details.

THE NOBLE & WESTBROOK MFG. CO.
Makers of Fine Marking Tools
EAST HARTFORD, CONNECTICUT

SIMPLEX-M Abrasive Band Grinder

This Grinder accelerates production and cuts costs. The use of this new modern machine assures straight grain finishes with sharp edges. *Details of this and other styles and sizes on request.*

WALLS SALES CORP.
96 Warren Street, NEW YORK

Giant KEYSEATERS

For production or job work—fast and accurate on a wide range of slotting, keyseating, splining and grooving. Work centers itself—requires no skilled operator. Write for catalog.

MITTS & MERRILL
913 Tilden St.,
Saginaw, Michigan

SEE THIS

AND MANY OTHER GRAND RAPIDS GRINDERS AT THE CLEVELAND SHOW BOOTH No. 307

No. 65 Grand Rapids Surface Grinder, Splash Guards in Position

See our . . .

Horizontal Spindle and Vertical Spindle Hydraulic Feed Surface Grinders

•

Universal Cutter and Tool Grinders

•

Twist Drill Grinders, and Tap Grinders

At the SHOW

Guard your profits

Investigate these finer, faster GRAND RAPIDS Hydraulic Feed Surface Grinders before placing your orders. Table speeds up to 125 feet per minute are instantly obtainable on the 12″ x 48″ Machine illustrated.

BULLETINS FREE ON REQUEST.

GALLMEYER AND LIVINGSTON COMPANY

310 STRAIGHT AVENUE, S. W. GRAND RAPIDS, MICHIGAN, U. S. A.

Vitrified Wheels

To help make production more efficient . . . . . .

Standardize on Vitrified bonded wheels for grinding operations. Their great strength insures long life; their wide range of grades makes them suitable for every specific need.

Use Vitrified Borite Wheels for precision production grinding as well as for keeping production tools in top notch condition.

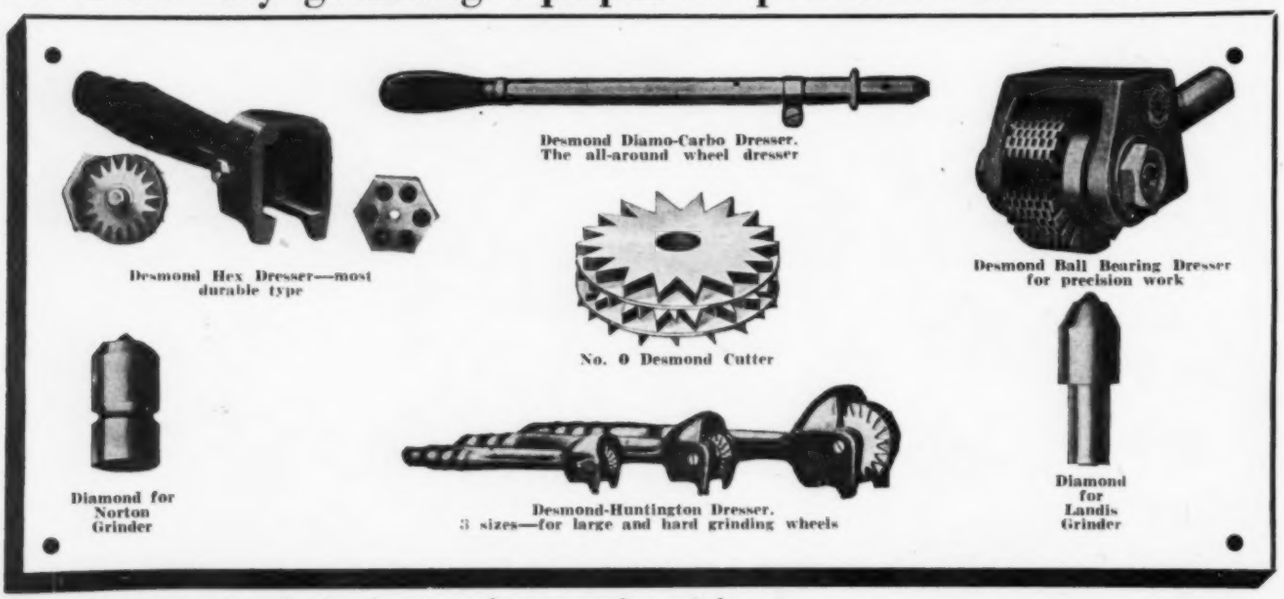
Use Carborite Wheels for economical grinding of cast iron, bronze, brass and similar metals.

Ask a Vitrified Representative to show you how easy it is to cut costs in grinding operations by standardizing on Vitrified.

VITRIFIED WHEEL CO., WESTFIELD, MASS.

THIS LITTLE EXHIBIT *shows you how*

to make any grinding equipment produce more for *Less!*

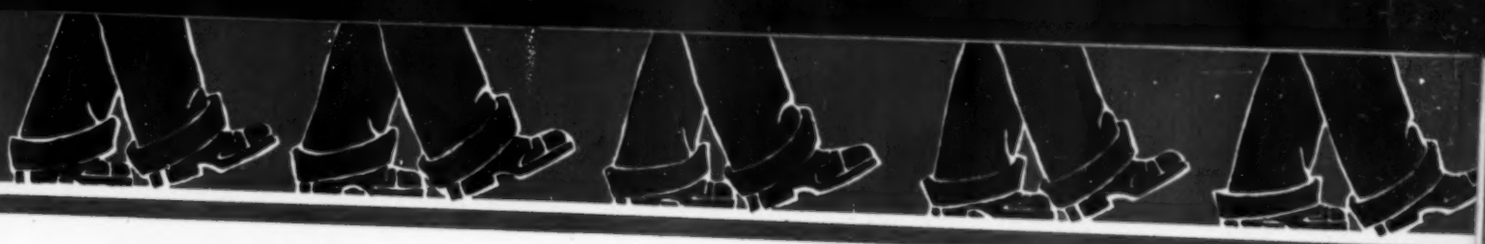

Desmond Diamo-Carbo Dresser.
The all-around wheel dresser
Desmond Hex Dresser—most durable type
Desmond Ball Bearing Dresser for precision work
No. 0 Desmond Cutter
Diamond for Norton Grinder
Desmond-Huntington Dresser.
3 sizes—for large and hard grinding wheels
Diamond for Landis Grinder

You can't expect peak production from even the most modern grinding machinery when grinding wheels start to "loaf" on the job. Desmond-Stephan Dressers keep the wheels fast-cutting, and true. There's a correct type for every wheel and grinding machine . . . revolving cutter, abrasive and diamond types. Easy to use properly, time-saving. Let us help you select the type best suited to your work.

Write for copy of Catalog "A" and name of your nearest dealer.

The Desmond-Stephan Mfg. Co.
Urbana, Ohio

The Canadian Desmond-Stephan Mfg. Co. Ltd.,
Hamilton, Ont.



SEE the OAKITE

TRADE MARK REG. U.S. PAT. OFF.

1935 MACHINE TOOL SHOW
CLEVELAND
SEPT. 11-21

"PARADE OF INDUSTRIES"

BOOTH A-103 Arena

SEE
this colorful PARADE of America's notable mechanical products... made today with NEW economy, NEW efficiency and NEW speed because of Oakite industrial cleaning materials and methods. A friendly and cordial welcome awaits you.

15,110 *Concerns Today*

Use OAKITE Materials and Methods

More than 15,000 concerns use Oakite materials and methods today for one reason only . . . they **BENEFIT** by cleaning work at **LESS COST** . . . by **IMPROVEMENT** in quality of product . . . by **FASTER** cleaning . . . by **BETTER**, more dependable cleaning and other worthwhile advantages.

Stop in at Booth A-103 Arena at the Machine Tool Exposition. Here you will find concentrated evidence of the practical, valuable help available to you in connection with tank or machine cleaning, grinding, cutting, rust proofing, pressure cleaning, stripping finishes and similar production operations. Look over the list of products at the right. Right now we are helping manufacturers of them lower costs through improved methods of cleaning. When you visit the Exposition, find out how YOU, too, can save money. Stop in at the Oakite Exhibit. Competent, experienced men will be there to answer your questions in detail.

26 Years' Successful Industrial Cleaning Experience

Back of the recommendations Oakite Service Men make is our 26 years' successful experience serving the nation's leading manufacturing organizations. Investigate now how you can profitably apply this experience to your work. There is no obligation, of course, because after all, the burden of proof rests entirely upon us. We **MUST** give you definite evidence . . . results that you can **SEE**. After all, you are the final judge and all we ask is the opportunity to place the facts before you.

Send For Your Booklet NOW!

Here is a booklet that is filled with data based on the experience of thousands of concerns. It tells how simple changes in cleaning and related operations have offset rising production costs. Every executive interested in saving money should have a copy of this booklet on his desk. It is easy to get . . . all you need do is send a postcard or letter with your name and address and this interesting, **FREE** booklet will come to you postpaid by return mail. Won't you write for it today?

OAKITE PRODUCTS, INC., 22 Thames Street, NEW YORK, N. Y.

OAKITE

TRADE MARK REG U.S. PAT OFF.

Industrial Cleaning Materials and Methods

Automobiles and Other Motor-Driven Vehicles
Buses, trucks, motorcycles, tractors, airplanes.

Automotive Parts and Accessories
Axles, brakes, carburetors, clutches, crankshafts, fans, fenders, pistons and rings, shock absorbers, springs.

Business Machines
Typewriters, adding and calculating machines, cash registers, tabulating, recording, numbering, duplicating, and vending machines.

Machine Parts and Unit Mechanisms
Cut gears, all types of bearings, flexible couplings, transmissions.

Machine Tools
Turning, planing, drilling, boring, milling, broaching and grinding machines, and all other power-driven machine building tools.

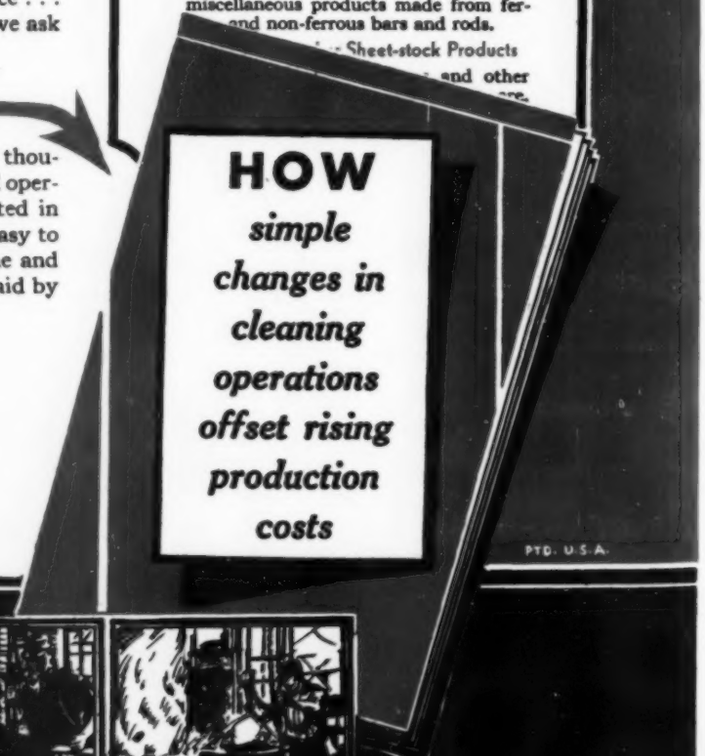
Machinery, Metal-working
Presses, punching, shearing, and forging machines; molding, die-casting, and wire-forming machines, power hammers, rolling mills.

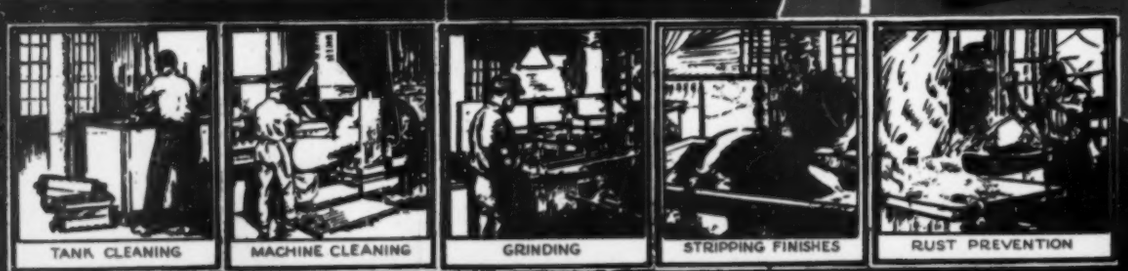
Machinery, Non-metal-working—Light Types
Sewing and dish-washing machines, vacuum cleaners, household refrigerating, shoe, tobacco, hat-making, and floor finishing machines.

Metal Products, Miscellaneous
Plumbing fixtures, wire goods, firearms, oil burners, valves, safes, chain, oil-well tools.

Screw Machine and Other Bar-Stock Products
Screws, bolts, nuts, pins, bushings, and miscellaneous products made from fer- and non-ferrous bars and rods.

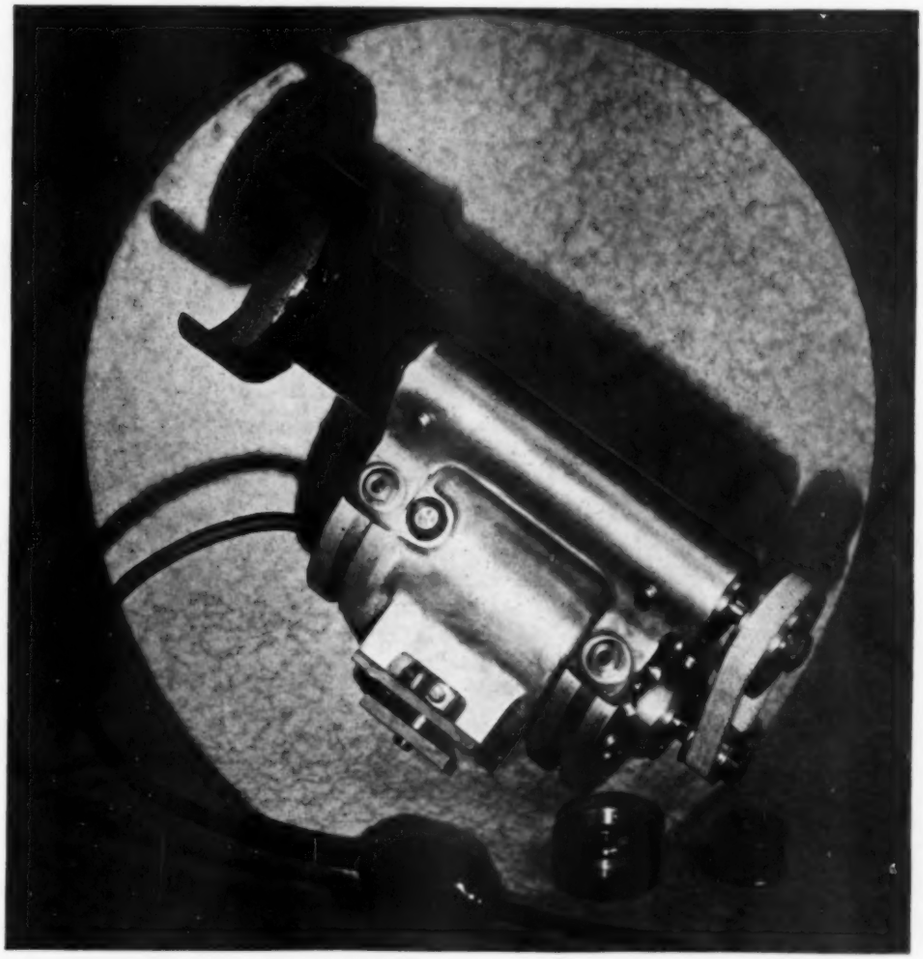
Sheet-stock Products and other





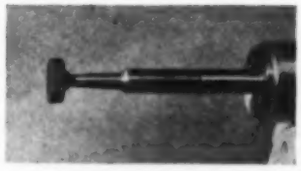
The precision THEMAC grinder

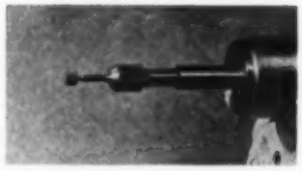
SIMPLE



ADAPTABLE

There are no difficult grinding jobs with this high speed precision tool





Simplicity and adaptability make the THEMAC GRINDER one of the most valuable for any shop.

No longer need there be any production delays on hard-to-get-at work. The THEMAC is designed to get into inaccessible places and handle the job quickly, efficiently, and accurately.

This portable, light-weight tool fits any lathe and offers many exclusive features:

. . . a circumferentially adjustable grinding spindle which can be locked in any position makes it possible to do any kind of grinding.

. . . grinder attaches directly to compound T-Slot and is quickly adjustable to any lathe center.

. . . grinding wheel can be used on right or left side—front or rear of motor.

. . . hardened and ground grinding spindle mounted on three Norma Precision Adjustable Ball Bearings for long life, super-accuracy and satin-smooth performance.

. . . spindle speeds from 7,000 to 36,000 R.P.M.

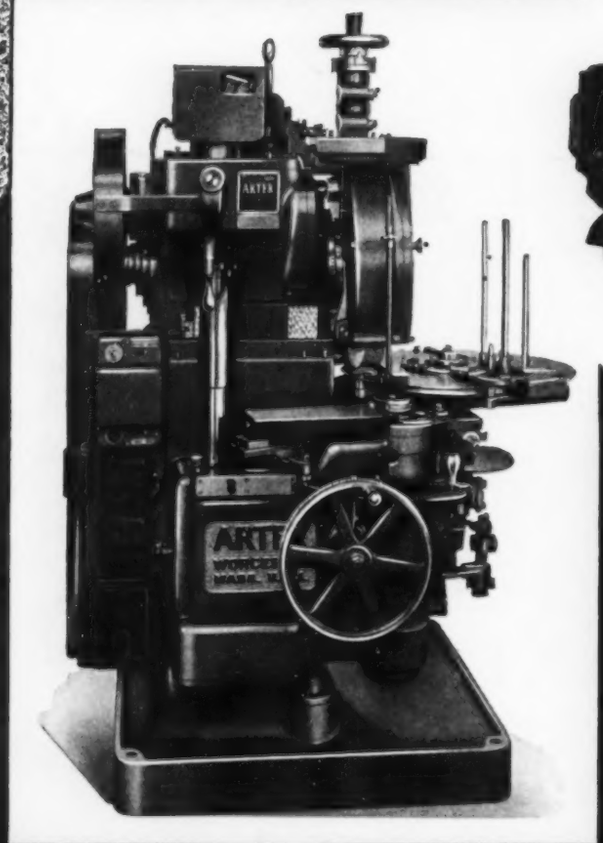
. . . machine complete weighs but 10 pounds.

Get all the details of the THEMAC—the Precision Grinder that pays for itself in time and money savings.

THE McGONEGAL MFG. CO., East Rutherford, New Jersey

See them at the Show

CLEVELAND - SEPT. 11-21
BOOTH 108



TWO ARTER GRINDERS OF ENTIRELY NEW DESIGN.

An Automatic High Speed Piston Ring Grinder with cam controlled down wheel feed.

An hydraulically operated Rotary Surface Grinder with built-in direct motor driven wheel spindle and oil motor driven chuck spindle.

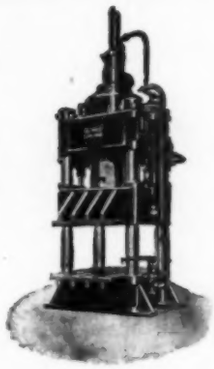
ARTER GRINDING MACHINE CO., WORCESTER, MASS., U.S.A.

ARTER GRINDERS

EST. 1851 HYDRAULIC MACHINERY SINCE 1851 ELMES CHICAGO INC. 1895

No. 3443 is a Heavy Duty, High Speed, Blanking and Forming Press with Single Lever Control.

It is particularly adapted for straightening and is constructed throughout to reduce deflection to a minimum and to readily handle irregular shapes.



No. 3443

PORTABLE JACKS AND FORCING PRESSES:

From 10 to 1000 tons capacity.

The variety of their usefulness is unlimited; utilized in pump, pits, mine shafts, ship holds, power stations, machine shops, engine works, motor works, locomotive works, etc.

No. 371

o.2297

Made for horizontal or vertical use with any dimension between bars up to 96". Hand, Belt or Motor Driven and Hydraulic Ram Return as desired.

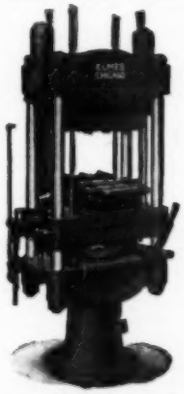
LABORATORY TESTING PRESSES:

No. 3429-X is for maximum pressures of 12 and 18 tons. The platens are 8" square with 16" vertical opening.

The press is shown equipped for molding tests with 6" square Hot Plates, Insulated Mats between plates and press heads, Industrial Type Thermometer and 3 Heat Switch to operate from electric light socket.

Moderately priced. Shipments from stock.

No. 3429-X



No. 2693

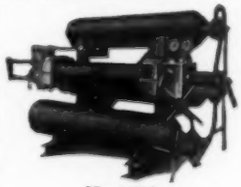
PLASTIC MOULDING EQUIPMENT:

No. 2693 is Semi-Automatic, the knockouts are returned without handling valves or moving press ram. The maximum clearance permits reseating knockouts and die buttons without loss of time.

HYDRAULIC ACCUMULATORS:

Gravity and Compressed Air Types:

The use of the Compressed Air Accumulator (No. 3014) dispenses with excavations, foundations and ballast material. Floor space and head room are minimized. They eliminate line shocks and other objectionable features.



No. 3014

SELF-CONTAINED INCLINABLE PRESS No. 4079

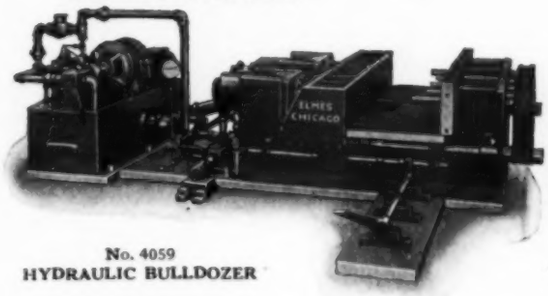
The operating part of this machine can be tilted to any convenient angle in a considerable arc to assist in rapid action.

There is practically no deflection in the platens. They are hardened and ground and measure 48"x18".

The power unit is mounted on top of the frame and connected through the necessary controls to the operating unit. The operation can be made fully automatic if so desired.

No. 4079

HYDRAULIC BULLDOZERS, AND SHAFT STRAIGHTENERS



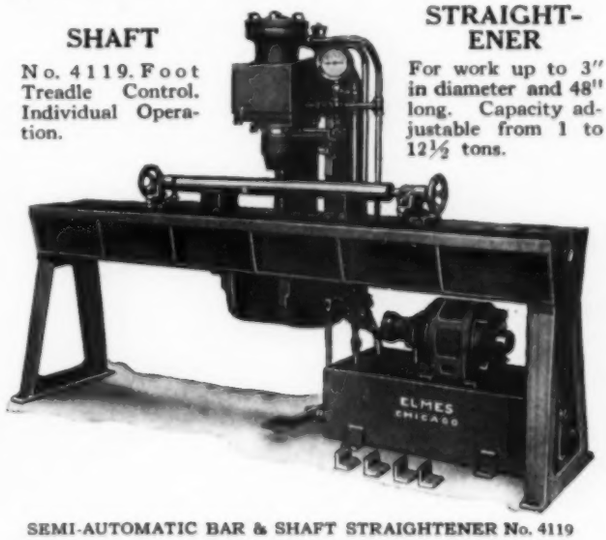
No. 4059
HYDRAULIC BULLDOZER

These Bulldozers are built for modern Hi-Speed Production and are designed for 18-9" strokes per minute. They are of all steel construction and featured by Automatic Reversal of stroke or Continuous Automatic Operation, Ease of Control and Pressure adjustment from 10 to 100 tons.

SHAFT STRAIGHTENER

No. 4119. Foot Treadle Control. Individual Operation.

For work up to 3" in diameter and 48" long. Capacity adjustable from 1 to 12½ tons.



SEMI-AUTOMATIC BAR & SHAFT STRAIGHTENER No. 4119

THE CHARLES F. HYDRAULIC MACHINERY SINCE 1851 ELMES CHICAGO ENGINEERING WORKS

Telephone: Haymarket 0696

1001-1013 Fulton St., Chicago, U. S. A.

OUT OF A DEPRESSION

—comes this Revolutionary Feeding Mechanism to ENFORCE Accuracy and Stop Costly Waste

ENGINEERS with more time for "creative thinking"... more time to apply their talents to the development of new and better devices... have contributed many valuable improvements in production equipment for industry. One of these achievements is the U.S. Automatic Slide Feed. Operating under a radically different principle this Slide Feed assures unfailing exactness in feeding to punch presses. Accuracy is ENFORCED to the extent that even non-uniform stock is fed without variation.

This mechanism may be new to you, but it already has proved to be a "wonder worker" in many well known plants. If you do any quantity of punch press work it will certainly pay you to investigate. Mail the coupon for our descriptive Bulletin. It tells how the U.S. Slide Feed removes the handicaps and costly wastes caused by inexact and slow feeding of coiled flat stock and wire.

U. S. TOOL COMPANY, INC.
AMPERE NEW JERSEY

Makers of Feeding Mechanisms, Stock Reels, Stock Straighteners, Die Sets and Accessories for the metal stamping industry.

MAIL COUPON FOR INFORMATIVE BULLETIN

U.S. TOOL COMPANY, Ampere, New Jersey
Send me the Bulletin on the U. S. Slide Feed.

Name, Title_____

Company_____

Address_____

● *FOR SETTING*
SOLID *RIVETS~*

THE "RIVITOR"

AN AUTOMATIC RIVETING MACHINE

Making possible the substitution of solid rivets for split or tubular rivets without the necessity of contending with the unsatisfactory method of handling which riveting solid rivets has always before meant. Not only does this machine do away with all these faulty conditions, but it accomplishes a joint that has been proven to have a 10% to 19% gain in strength.

Its unique method of heading, its positive selector assuring a rivet at every operation, its dependable hopper supplying an ample amount of rivets, its versatility, making it capable of handling various types of work, its capacity of setting solid, tubular, or split rivets up to and including $\frac{1}{4}$" diameters of various lengths and heads, goes to make this machine a very important item in successful production riveting.

● *LET US SUBMIT SAMPLES OF YOUR WORK DONE IN THE RIVITOR METHOD*

THE TOMKINS-JOHNSON COMPANY
615 N. Mechanic Street, Jackson, Michigan

CARD

Stub Machine Screw Taps

B 4 Carbon Steel

No. 1127 Spiral Pointed

No. 1126 Three Fluted

Features . . . Overall length 1¾ in. in all sizes. Shorter shank and shorter thread — increased strength.

Made from our special B4 Carbon Steel—a vanadium alloy steel that is the toughest and strongest we know about for these small taps.

Cut-back relief, plugging ground. Flutes milled taper. Close to maximum limits. Longer life.

Recommendations . . . For all types of tapping machines used in tapping radio parts, lamp socket pieces, thin sheet metals, punched or drilled holes. For electric hand drilling and tapping machines.

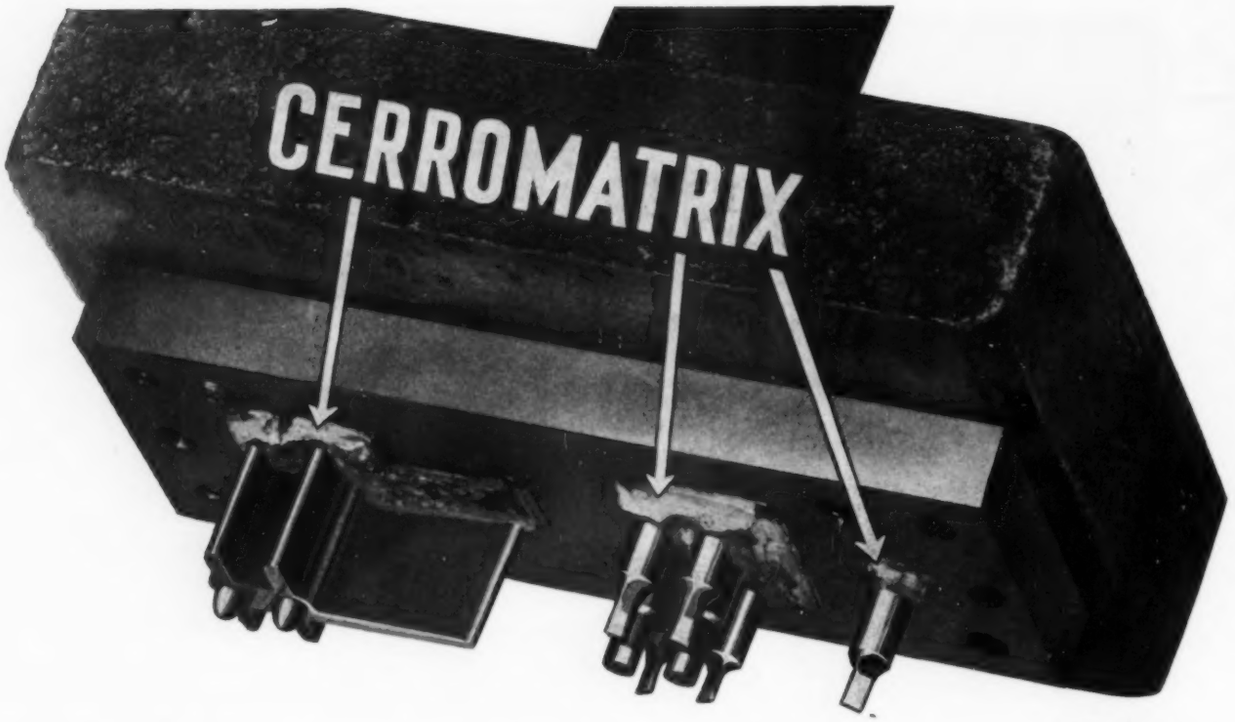
No. 1126 or No. 1127 are used on the same work, depending largely on the preference of the user.

Send for circular on designs and recommended uses.

Sold by leading dealers everywhere

Faster speeds—less breakage—longer life—more holes.

S. W. CARD MFG. CO.
DIVISION OF UNION TWIST DRILL CO.
MANSFIELD, MASSACHUSETTS, U.S.A.



Small Punches and Dies, too, are made more economically

with

CERROMATRIX

Punching (actual size) made in two-stage progressive die, with punch shown above. Courtesy of American District Telegraph Co., in whose shops the die was made and used.

Most production executives and tool room foremen now appreciate the big savings secured through the use of CERROMATRIX in making large complicated dies and punches, but not so many realize that equally important advantages are achieved through its use in the production of smaller work of the same nature.

Even a casual study of the relatively small and simple two-station punch illustrated above will show, however, that a great deal of expensive machine work has been saved by cutting oversize locations in the punch plate and setting the eight separate punching parts in CERROMATRIX after they had been located and clamped in their correct relative positions.

No matter how large or how small your punch and die parts may be CERROMATRIX opens to your die designer a new technique which will not only enable him to achieve big savings in shop costs, but in many cases will enable to construct dies that would otherwise be economically impossible to consider.

Remember, also, that CERROMATRIX is in no way a make-shift, but is as durable as any other method of fastening. Our 32-page treatise showing how CERROMATRIX is now used in many well-known shops should be in the working kit of every die designer and will be furnished promptly on request without charge or obligation. Write for it today.

INVESTIGATE

the money-saving possibilities in your own plant, of

CERROMATRIX (Matrix Alloy): a low-temperature-melting, hard-setting and non-shrinking material, widely used for holding die parts in position.

CERROBEND (Bendalloy): a low-temperature-melting metal for use as a filler for bending tubing, moulding, etc.

CERROSAFE (Safealloy): a low-temperature-melting metal developed for use on toy casting sets.

CERRODENT (Dentalloy): a low-temperature-melting, non-shrinking hard-setting alloy developed for the dental laboratory.

CERROSEAL (Sealalloy): a low-temperature-melting metal for use in making tight seals between glass and metal.

CERROBASE (Basealloy): an ideal metal for foundry use in duplicating wood patterns quickly and cheaply. Also useful as a nitriding seal for heat treatment baths and bright anneal furnaces.

CERRO de PASCO COPPER CORPORATION
44 Wall Street . . New York

And now-

FOR THE MOST MODERN-

IN ROLLED STEEL CONSTRUCTION

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DESIGN

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SAVINGS

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SET-UP

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SEND FOR-

"WELDING FOR THE MECHANICAL INDUSTRIES"

DANLY MACHINE SPECIALTIES, Inc.,
2110 So. 52nd Ave., Chicago, Illinois

Send me the 12 page book—free—"Welding For the Mechanical Industries"—describing the advantages of Danly-Smith Welding.

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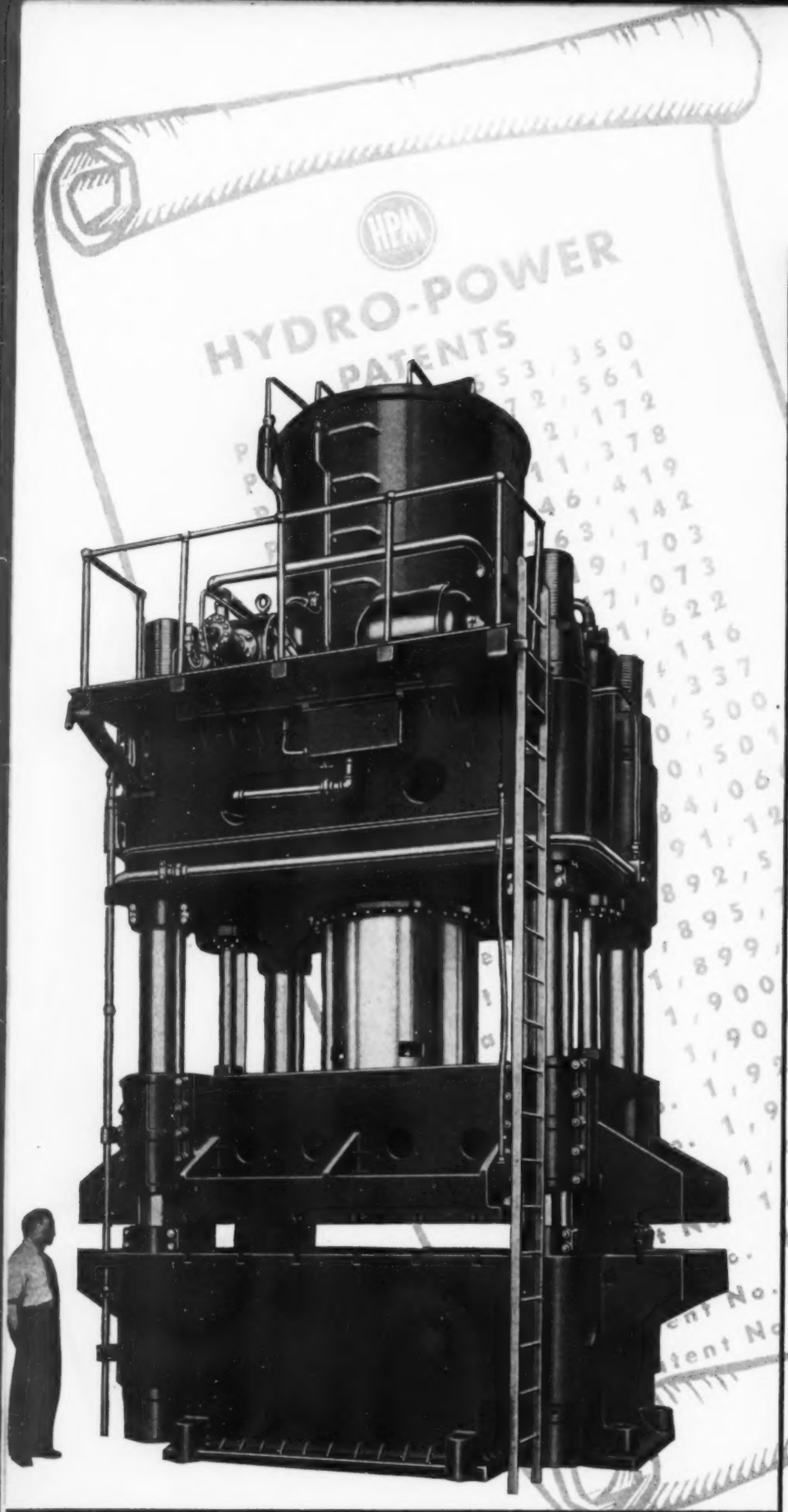


THE *Challenge* OF LEADERSHIP

● THE HIGH SPEED HYDRAULIC PRESS was originated and perfected by the Hydraulic Press Manufacturing Company.

The many exclusive H-P-M developments resulting from exhaustive study of the production press requirements of modern industry have resulted in today's most outstanding hydraulic achievement-THE H-P-M HYDRO-POWER FASTRAVERSE PRESS.

Behind this press is a fundamental idea-embracing the press operating and control system. This system-perfected without deviation from basic principles-accounts for the complete success of H-P-M HYDRO-POWER. To this the many and varied H-P-M Press installations attest in a very conclusive, practical way.

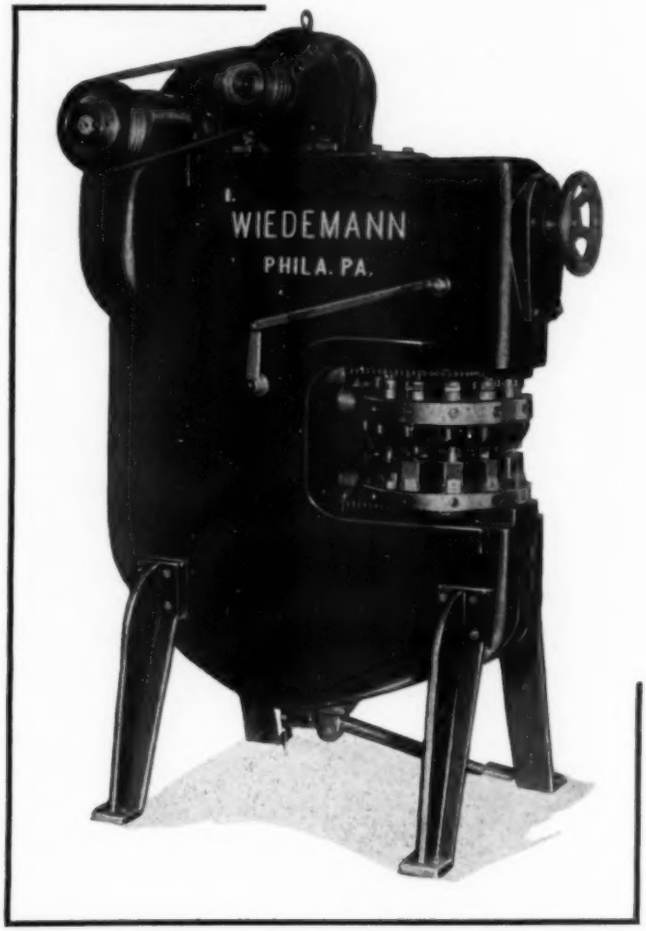
More than fifty patents, either granted or pending, substantiate H-P-M's claim to leadership in this development which it has pioneered.

● **See H-P-M's working exhibit in space 1014-Machine Tool Show, Cleveland, September 11-21.**

THE HYDRAULIC PRESS MFG. CO., *Mount Gilead, Ohio, U.S.A.*

HYDRO HPM POWER

To see these TURRET PUNCHES *at* CLEVELAND is to realize why they would save in your shop



The TYPE R-5 HEAVY DUTY (18″ Throat) . . . . . The TYPE R-6 HEAVY DUTY (30″ Throat)

Both these machines have one-piece Meehanite frames, correctly proportioned for their rated capacity of 80,000 lbs. Either type will punch 1″ holes in ½″ mild steel plate.

The Type R-5 is equipped with 12 stations and the Type R-6 with 15.

These punches are powerful, sturdy, remarkably easy to operate and highly economical on heavy work.

Clutch is controlled with foot pedal interlocked with turret locking lever. All main bearings are cast integral with frame and are bronze bushed. Worm and flywheel shaft are ball bearing mounted. Crankshaft is of high carbon steel, while ram and punch holders are of heat-treated chrome vanadium steel. Punches and dies are of high carbon steel hardened and ground.

These are but a few of the details of design and construction which result in the long life and high accuracy of these heavy duty punches. Full details on request.

THE TYPE R-4P DEEP THROAT

This is a power driven machine for rapid, continuous duty. Its capacity is 24,000 lbs. pressure.

Frame side plates are cut from mild steel, with machine finished to jigs for accuracy and interchangeability.

Clutch, foot pedal operated is safe, rugged and mechanically interlocked so that turret must be indexed and locked before tripping.

Punches can be easily and safely brought down to center punched layout by handwheel, on even the thinnest sheets.

The Type R-4P is made in throat depths of 18″, 24″ and 28″. It can be depended on for high accuracy. Standard arrangement is with 12 station turrets or 8 station turrets for large diameter holes.

Detailed specifications, capacities, etc., available on request.

WIEDEMANN MACHINE COMPANY

1815-31 SEDGLEY AVENUE, PHILADELPHIA, PA.

Booth No. E-313 . . . . Machine Tool Show

Setting amplifying gage with a combination of 3 Johansson Gage Blocks.

YESTERDAY .001"
TODAY .0001"

LIMITS ARE GETTING CLOSER

MANY of the limits long established in thousandths of an inch are being changed to ten-thousandths. This demands increased accuracy of jigs and fixtures — machine tools must produce parts with greater precision.

JOHANSSON
GAGE BLOCKS AND ACCESSORIES

are the practical and economical solution to increased accuracy in your tool room or inspection work. They are real time-savers. Low prices for "B" quality Blocks — accurate to .000008 inch — permit their use even in the smaller shops.

Manufactured, sold and serviced in the United States by

FORD MOTOR COMPANY

Johansson Division **Dearborn, Mich.**

SEE THE JOHANSSON DISPLAY AT THE CLEVELAND MACHINE TOOL SHOW. BOOTH A-201.

RANDALL and STICKNEY
Dial Gauges and Indicators

Model C

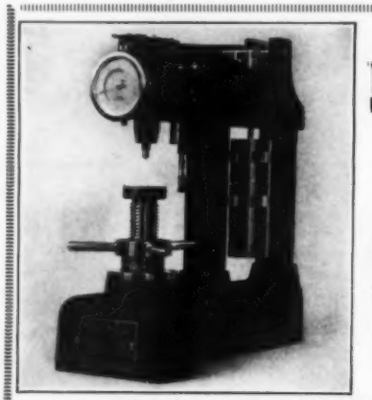
are accurate, reliable and built to stand the gaff of hard usage.

This Model C Dial Indicator has a 2⅛ in. diameter dial, with 50 or 100 divisions. Can be furnished in graduation of .001-in., .0005 in. or .01mm. Has a ½-in. range, movable dial easily set at zero.

The cases on all R.&S. Gauges are made from sturdy castings. The case and plate are two separate units, so that repairs can be made easily.

There is a R.&S. Gauge for practically every purpose. Write for catalog describing our complete line.

RANDALL & STICKNEY
Waltham, Mass., U. S. A.
Makers of Dial Gauges Since 1885



"ROCKWELL" HARDNESS TESTER

Made by

WILSON
MECHANICAL INSTRUMENT CO. INC
736 East 143rd St.
New York, N. Y.

Exclusive representatives throughout Canada
THE CANADIAN FAIRBANKS-MORSE CO., LIMITED

Be sure to Cross the Street from the Machine Tool Show . .

To see our individual exhibit and demonstration of the **ZEISS OPTICAL INSPECTION METHOD.**

PRIVATE SHOWROOMS AT 620 ST. CLAIR AVE. CLEVELAND

Also on exhibit: **New size PARKSON GEAR TESTER and HEYNAU STEPLESS SPEED VARIATOR for building into Machine Tools to obtain infinite range of spindle speeds at constant power.**

CARL ZEISS JENA

GEORGE SCHERR CO. 126 Lafayette St., NEW YORK

Precision in industry has been advanced during more than forty years by Ames products—gauges, bench lathes, millers and shapers. Look to Ames for Accuracy.

B. C. AMES CO., WALTHAM, MASS.

MODEL 35 ACME

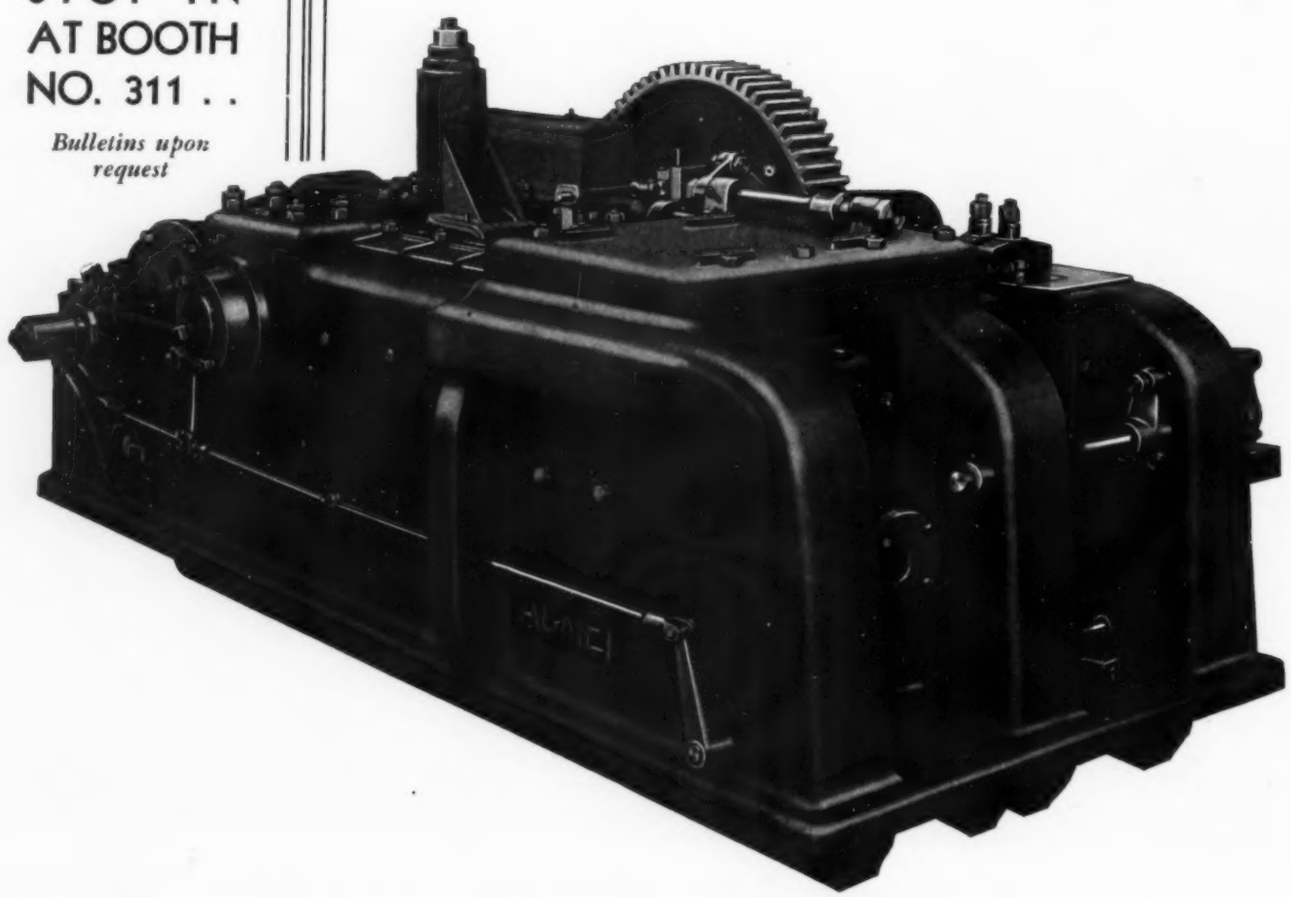
CUSHIONED DRIVE FORGING MACHINE

Acme announces Model 35 — A machine which is novel — distinctive — new. This new Acme represents the latest development of a complete line of all-steel heading upsetting and forging machines.

Strength, durability and ease of operation are built in. It will be on display for the first time at the Machine Tool Show. Don't miss it.

STOP IN AT BOOTH NO. 311 . .

Bulletins upon request



THE ACME MACHINERY CO.
CLEVELAND, OHIO, U.S.A.

SHOWN FOR THE FIRST TIME AT THE MACHINE TOOL SHOW .....

MODEL 35 ACME

THREADING MACHINE

This new Acme Threader has been developed as a high production machine for work up to 2 inches in diameter.

Centralized control, eight speed changes through selective type gear box, pick off gears for a wide range of pitches, automatic flood lubrication, huge reservoir in base for ample coolant and tangent type Die Head — are a few of the features that account for high productivity and continued accuracy of Acme Bolt Threaders.

Ease of operation, sturdy construction, modern streamline design provide constant, rapid production with minimum of fatigue.

Look this machine over at the show.

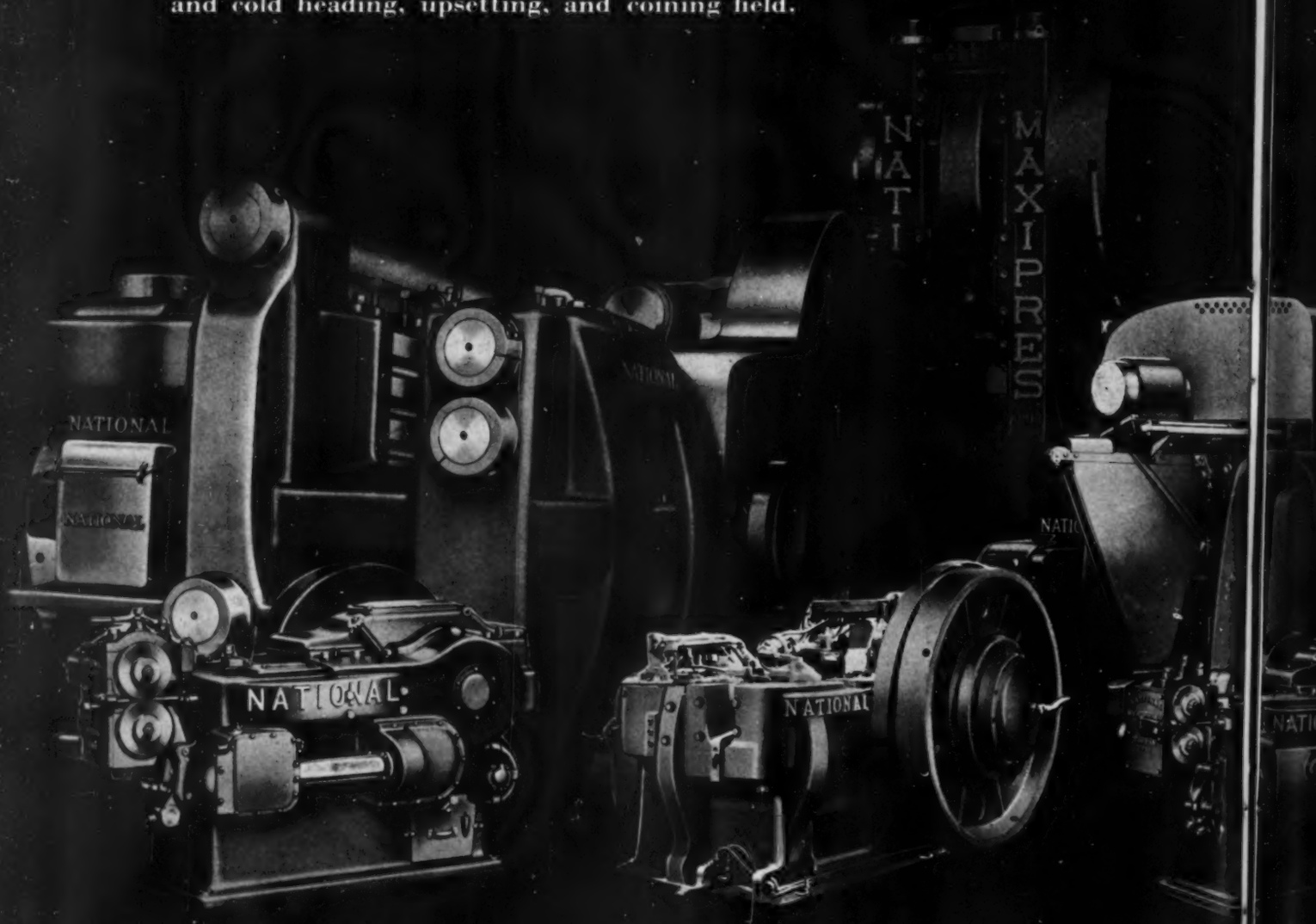
BULLETINS will be furnished on request . . .

THE ACME MACHINERY CO.
CLEVELAND, OHIO, U.S.A.

INTENSIFIED DEPRESSION

DURING the past five years National's entire Engineering Staff has been working at full speed — improving and perfecting the art of machine forging.

With a background of over sixty years to build upon, these New and Improved Nationals continue to set the pace of progress in the hot and cold heading, upsetting, and coining field.



THE NATIONAL

TIFFIN,

New York

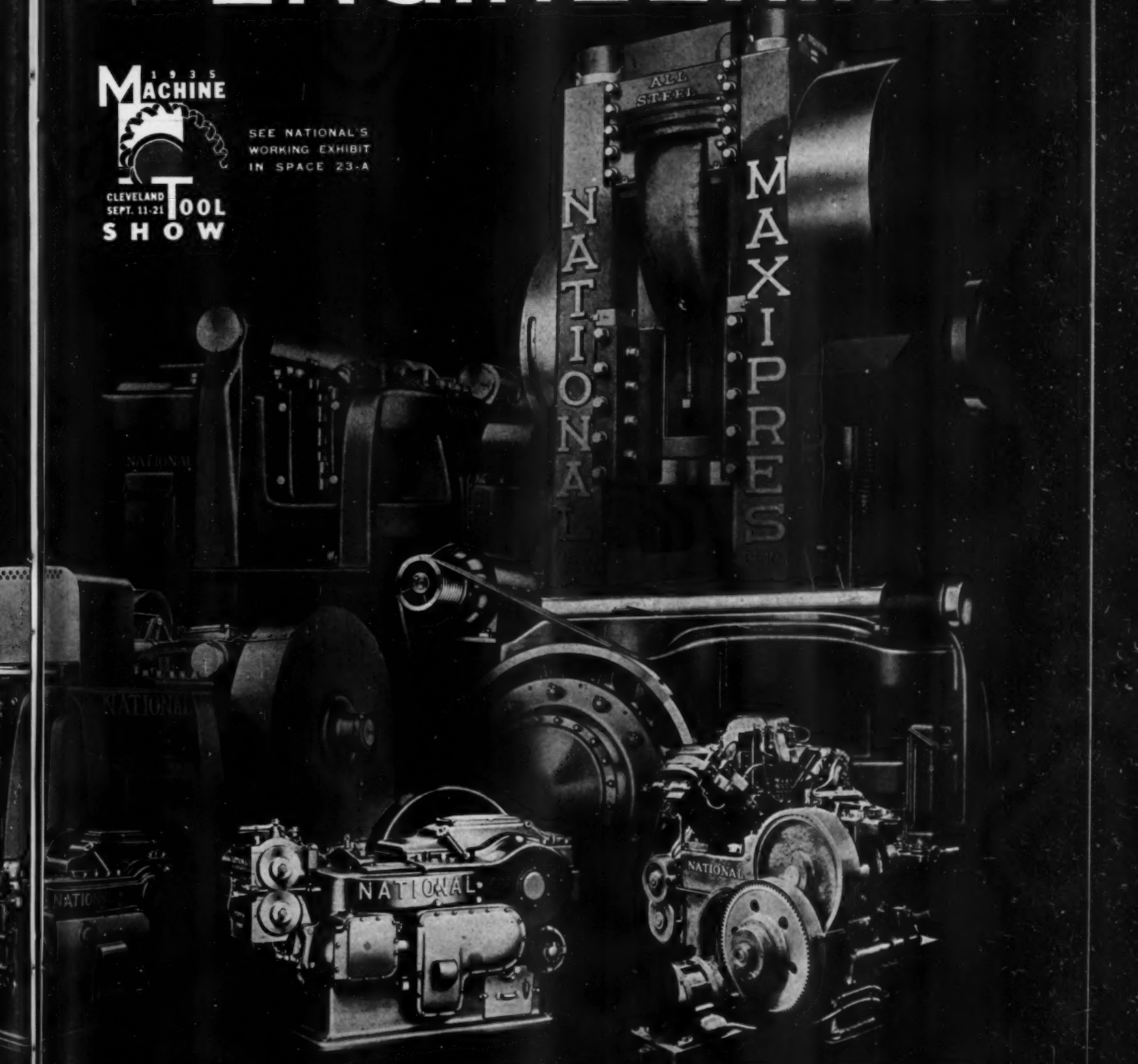
Detroit

PERIOD

ENGINEERING!

1935 MACHINE TOOL SHOW
CLEVELAND SEPT. 11-21

SEE NATIONAL'S WORKING EXHIBIT IN SPACE 23-A



MACHINERY CO.

OHIO

Chicago

AJAX

Air Clutch Operated

FORGING MACHINE

AND

AJAX-HOGUE WIRE DRAWER

WILL BE ON DISPLAY

IN BOOTH "F" AT THE

MACHINE TOOL SHOW

•

We wish to extend an invitation to those interested to visit our modern plant at Euclid, Ohio

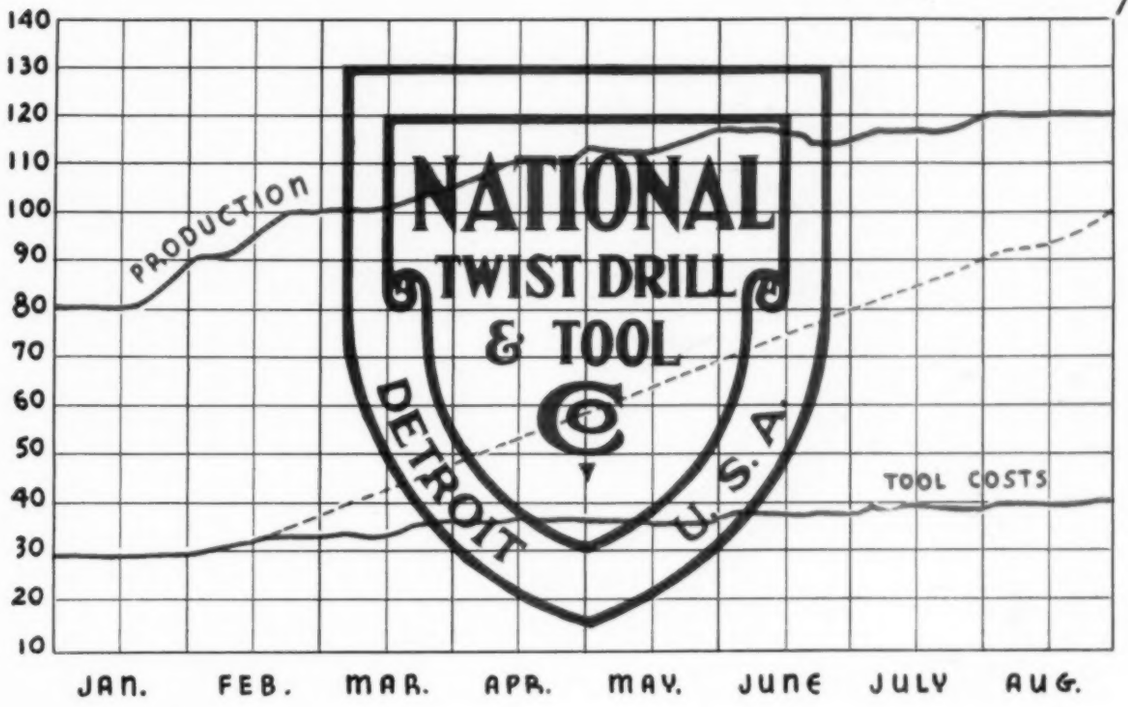
THE AJAX MANUFACTURING COMPANY

EUCLID BRANCH P. O. CLEVELAND

CHICAGO OFFICE: 621 MARQUETTE BLDG.

WHAT DOES YOUR

TOOL COST CURVE *Say?*



WHEN THE GOING GETS

TOUGH...

When the Production Curve starts climbing, when everything is slam, bang, hustle and rush—does your Tool Cost Curve start to climb out of proportion and out of sight? Or does it stay down where it belongs? » The in-built Stamina of NATIONAL Cutting Tools is the one thing that the eye cannot detect, but which does make the difference.

TWIST DRILLS, REAMERS, HOBS, MILLING CUTTERS, SPECIAL TOOLS

●

NATIONAL TWIST DRILL & TOOL CO.

DETROIT, U. S. A.

TAP AND DIE DIVISION, WINTER BROS. CO., WRENTHAM, MASS.

PROTECTED *Quality*

PACKAGING of NATIONAL Cutting Tools has been improved, first of all, with the idea of giving adequate protection to a quality product.

It is intended, not only to deliver these tools to the user in good condition; but also to give them proper protection from accidental damage and from the ravages of rust, until such time as they are to be used.

The NATIONAL scheme of Tool Packaging also has other advantages:—

Easy Identification

Each class of tools are packed in distinctly colored packages, for quick and easy identification. High Speed Steel Drills and Reamers come in RED packages. Carbon Steel Drills and Reamers come in BLUE packages, while High Speed Steel Milling Cutters and Hobs come in GREEN packages.

Easily read labels give the size and quantity contained in each package at a glance.

Neatness and Convenience

Packages are strong, and are symmetrical in shape so that they can be stacked into the users' bins or on the dealers' shelves in an orderly and accessible manner. No more helter-skelter piles of packages in the tool bins.

For the Inventory

All NATIONAL Tool Packages are sealed at the Factory in such a way that the seal cannot be easily duplicated. Breaking of packages for inventory purposes is therefore unnecessary. Merely examine the seal and read the label.

THE WINTER BROTHERS COMPANY

WRENTHAM, MASS.

MANUFACTURERS OF **PRECISION TAPS & DIES** *SINCE 1900*

▸ BRANCH STORES ◂

CHICAGO, ILLINOIS DETROIT, MICHIGAN CLEVELAND, OHIO
PHILADELPHIA, PA. NEW YORK, N. Y. PITTSBURGH, PA.

▸ DISTRIBUTORS ◂

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Oliver H. Van Horn Company, Inc.
New Orleans, La. and Branches
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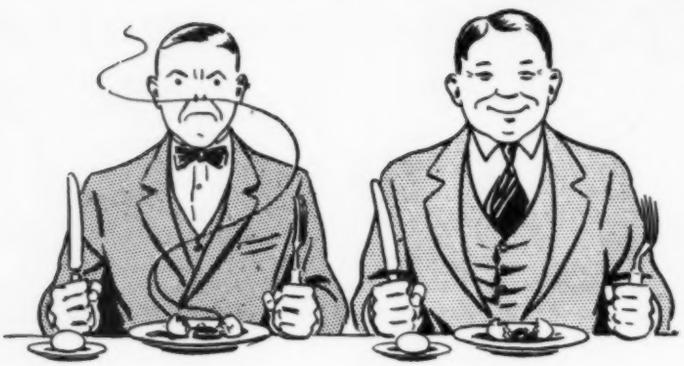
Young & Vann Supply Company
Birmingham, Alabama

Don't be misled because they all look alike

THERE *IS* A DIFFERENCE!



Small tools can cause plenty of grief if you buy them on the basis that they all look alike—There's a difference.

The real worth of Morse Tools isn't skin deep appearance; it's built-in quality—built in through years of painstaking study and development, years of ceaseless application to the job of making the world's best cutting tools. When you specify Morse, you trust to known fact, not guess-work. You can rest assured of the longest working life and the lowest possible production cost.

MORSE

TWIST DRILL & MACHINE COMPANY

NEW BEDFORD, MASS., U.S.A.

New York Store
92 Lafayette Street

Chicago Store
570 West Randolph Street

THE MORSE LINE INCLUDES: High Speed and Carbon

DRILLS REAMERS CUTTERS TAPS AND DIES SCREW PLATES ARBORS
CHUCKS COUNTERBORES MANDRELS TAPER PINS SOCKETS SLEEVES

★ No matter how you come to the Machine Tool Show—from roller skates to airplanes—we invite you to visit our booth and let us show you the latest in twist drills, reamers and other small cutting tools. We think we shall have some interesting things to show you.

When you arrive at Cleveland Public Auditorium, all you have to do is to walk straight along the Arena Floor to

BOOTH E-306

where we shall be glad to meet you. Just look for the revolving drills.

The CLEVELAND TWIST DRILL COMPANY
1242 EAST 49TH STREET
CLEVELAND

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

30 READE ST. NEW YORK · 9 NORTH JEFFERSON ST. CHICAGO · 654 HOWARD ST. SAN FRANCISCO
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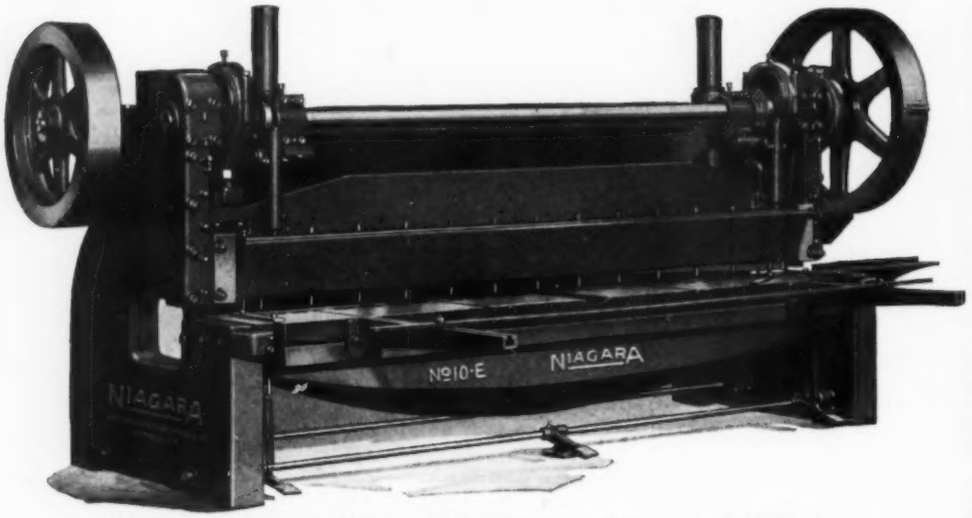
33,700 NIAGARA SQUARING SHEARS



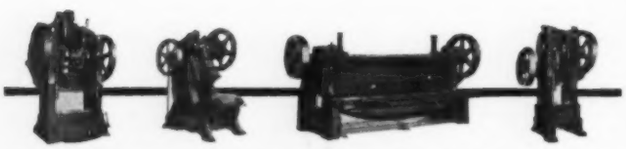
A large manufacturer of farm implements recently commented "We have two Niagara Shears 24 years old,—still going strong!" Niagara Shears in other plants now operating satisfactorily after 40 years' service.

Have Met Every Test of Time and Hard Service

Exclusive design . . . controlled analysis of materials . . . specialized manufacturing methods are the foundation of Niagara Shears, and their reputation.

They are preeminent for smoothness, straightness, accuracy and rapidity of cutting. The patented Niagara holdown does not pound and mar the work, and it does not pein the bed of the shear.

Capacities up to ¾ inch plate in all cutting lengths. Send for new Bulletin 72-E showing the latest improvements on Niagara Shears.



NIAGARA

NIAGARA MACHINE & TOOL WORKS, Buffalo, N. Y.; 50 Church St., New York City; General Motors Building, Detroit

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AMERICAN SWISS

FILES OF PRECISION

SWISS PATTERN FILES

are the only type of files which we manufacture

Our undivided attention in the manufacture of American Swiss Files of Precision is reflected in our quality product.

FILES ONLY THE BEST AND GOOD TOOLS

Manufactured regularly in 2000 different shapes, cuts and sizes and having a longer life and faster cutting qualities assures one of a saving in filing cost.

Buy from your nearest Distributor.

A trial order will prove mutually beneficial.

SPECIAL FILES MADE TO ORDER

AMERICAN SWISS FILE & TOOL CO.

410 TRUMBULL STREET — ELIZABETH, NEW JERSEY

Manufacturers of Mechanics Hand Tools & Knurls

"Twelve Perfect Files in Every Dozen." That is what industrial file buyers are assured of when they buy Nicholson Files. That is why Nicholson Files have a reputation for being absolutely Reliable in hundreds of plants. Nicholson Files are made by experts who have the best raw materials and unrestricted facilities at their disposal. No wonder Nicholson Files are Reliable - - the leading file value everywhere - - Popular prices. At hardware wholesalers and mill supply dealers. Nicholson File Company, Providence, Rhode Island, U. S. A.

Genuine NICHOLSON FILES

A FILE FOR EVERY PURPOSE

Below: Finishing work in lathe is one of the machine operations that gives proof of endurance and dependability of Disston Files.

Disston Machine Shop operations that test files. *Left:* Filing keyway in drop-forged giant wrench.

Above: Radius filing that requires files of smooth cutting ability. *Below:* Cleaning out punched sprocket holes test the durability of Disston slotting files.

Machine Shop Proof

Steel of high grade, for all purposes, is produced by the Disston Works.

Every type saw is made here;

Every type of file, hundreds of kinds of tools, machines, machine parts manufactured, for all the world to use.

And files are consumed here by the thousands of dozens! —

Consumed in operations that are much the same as the filing operations in your own plant—meeting production conditions as exacting as your own.

So, Disston Files are carefully made,—

With quality *pre*-determined by Disston Laboratory research . . . checked by laboratory tests, process inspections and tests, machine testing, and, finally, by performance in day-by-day service.

—

WRITE for Disston Metal-Cutting Manuals: "Files", "Hack Saws", Circular Saws", "Band Saws", etc. Free!

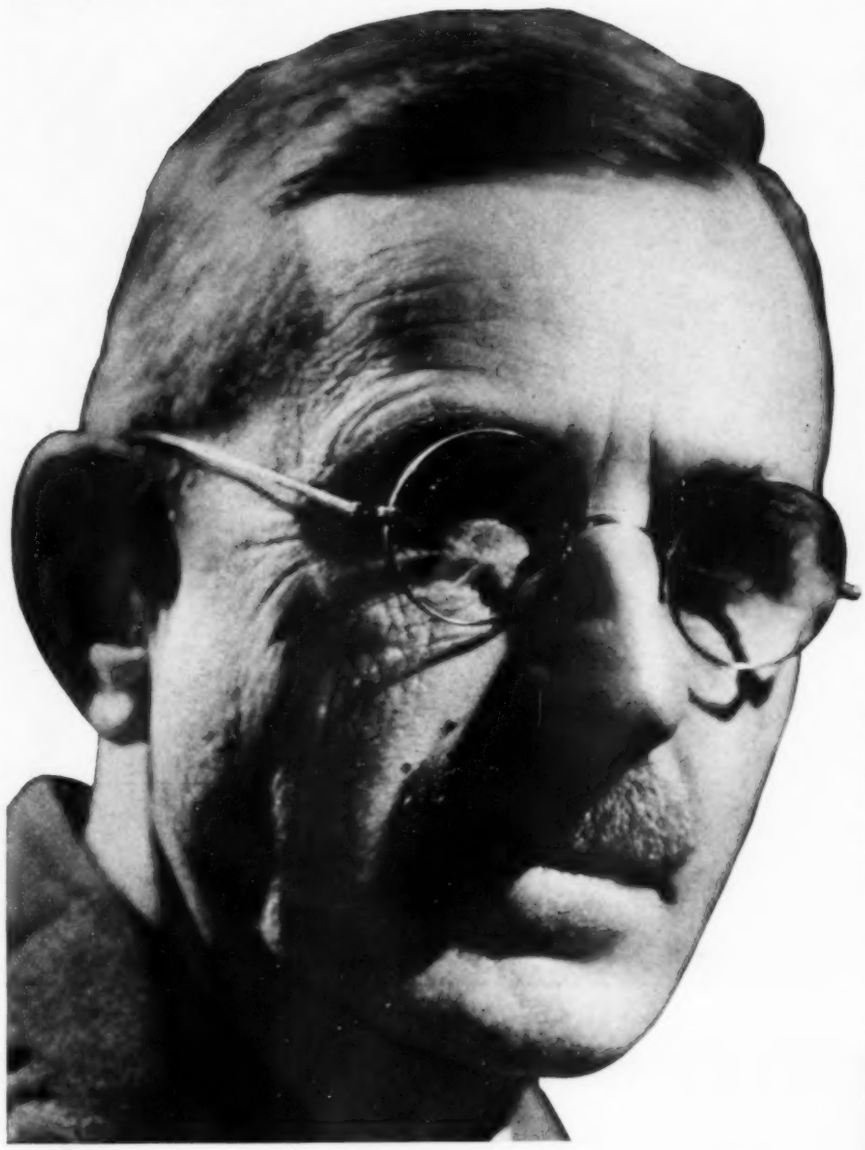
HALF-ROUND FILE. —Rugged, keen type of tooth, designed to remove metal rapidly without clogging, makes this file most desirable for machine shop use — the file with the strong heart and long life.

HENRY DISSTON & SONS, INC., 920 TACONY, PHILADELPHIA, U. S. A.

Branches: Bangor, Me., Boston, Chicago, Detroit, Memphis, New Orleans, Seattle, Portland, Ore., San Francisco, Vancouver, B. C.
Canadian Factory: Toronto

DISSTON

Visit the Starrett Display at Booth A-203, Machine Tool Show, Cleveland, Sept. 11-21.

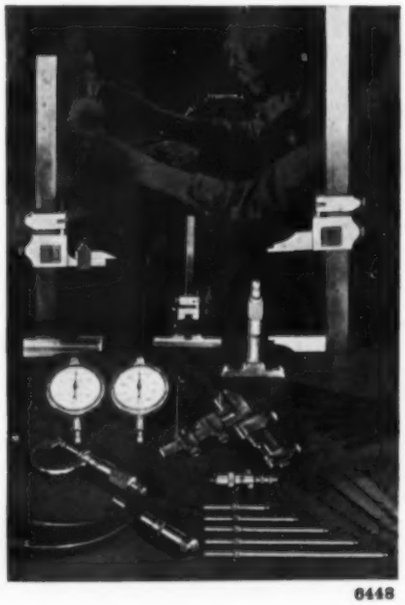


YOUR MEN *Prefer* STARRETT TOOLS

"Errors are poison in our shop. A slip-up on the kind of work we do means wasting real money. You can bet I don't take any chances when I'm working on an expensive part. I use tools I know will never let me down—Starrett Tools. *I've known them and used them ever since I started in as a raw apprentice more than forty years ago. In all that time I've never known a Starrett Tool to lie about a close measurement. That's why I say, give me Starrett Tools to work with and I'll give you good, fast work on any job."*

It's a fact, your men do better work when they have confidence in their tools. And every machinist would rather work with Starretts. Write for Starrett Catalog No. 25 "C." It describes and illustrates more than 2500 Starrett Shop Equipment Tools.

THE L. S. STARRETT CO.
World's Greatest Toolmakers
Manufacturers of Hacksaws Unexcelled
Steel Tapes—Standard for Accuracy
Athol, Mass., U. S. A.



6448

In SMALL TOOLS

A controlled science

Sales Offices and Stock at: BIRMINGHAM BOSTON CHICAGO CINCINNATI CLEVELAND DETROIT

PRATT & WHITNEY COMPANY

it's METALLURGY

Steel treating, with us, is a matter of facts and knowledge. Nothing is left to guesswork. Laboratory research has pointed out the hardening specifications for every tool, and each individual treatment is carried out to the degree and the second by automatic temperature controls and electrical timing. Accurate electric heat hardens and draws the steel. Is it any wonder that Pratt & Whitney tools are *uniformly* hard and tough?

Take a sample order of a dozen taps, for instance. The blanks are made from a particular carbon, alloy, or high speed tool steel fitted for the job—steel that has passed P&W laboratory analysis before it can even reach our storage racks. Metallurgical experts make out a heat treating record card specifying the temperature and time for both hardening and drawing. The blanks go to a modern, fully equipped hardening room, where every detail is under close supervision. Automatic controls wherever possible, daily checking of pyrometers, electric timing, the skill of expert operators—all are kept at highest efficiency to produce those tools to specifications.

These taps must be of the definite hardness that long experience has proved is best. That is why they are inspected for both Rockwell hardness and file hardness. The results must check against the specified record. And, should another order of those same taps be wanted, the records are on file and can be duplicated.

These are some of the reasons why Pratt & Whitney tools are tough and good. Mechanics the world over know and like them. When next you are buying small tools, remember that proper steel, controlled heat treatment, and efficient design are requisites of all good tools, and of every one made by Pratt & Whitney.

Let us send you a copy of our new catalog, Number 14. In it is much valuable data that shop men need and use almost daily.

at Pratt & Whitney

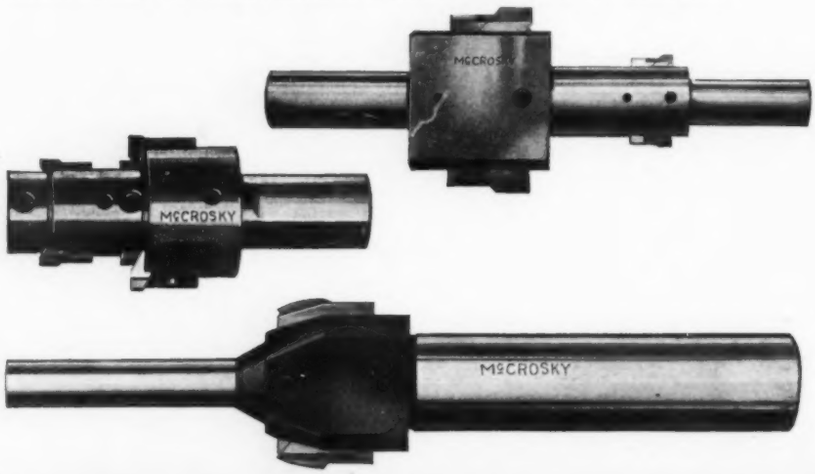
LOS ANGELES NEW YORK PHILADELPHIA PITTSBURGH
ROCHESTER SAN FRANCISCO ST. LOUIS

HARTFORD, CONNECTICUT

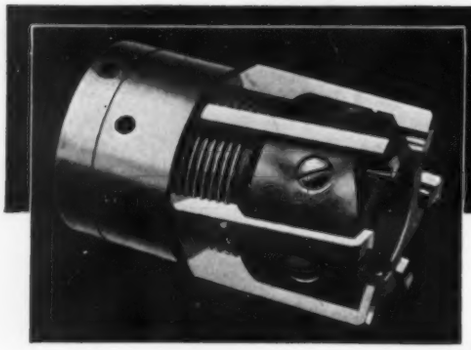
McCrosky Boring Blocks and Bars

with Centralizing V Lock

McCrosky's new and improved design of centering key locates and locks the cutter block with extreme accuracy. It is readily adaptable to special bars designed for unusual jobs.

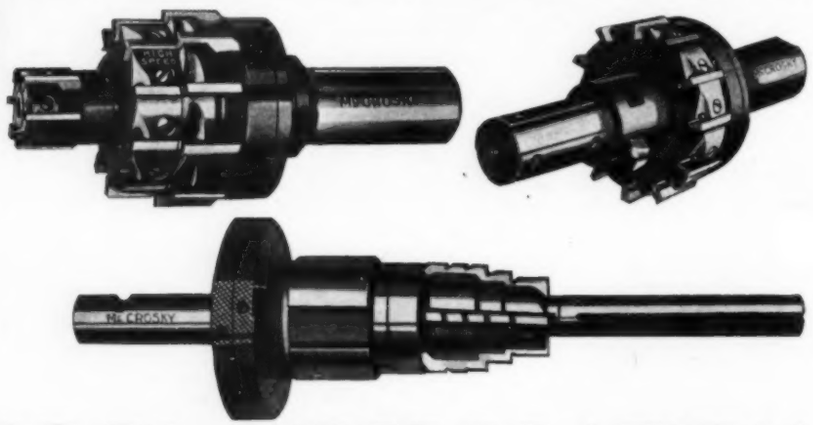


- McCrosky Blocks made in 5 different sizes with wide range of cutting diameters.
- Hardened to resist wear and damage
- Can be inserted or removed from bar without disturbing centering key
- Large and economical blade adjustment
- Cutting thrust taken by separate hardened thrust block behind cutter block



McCrosky-SUPER Adjustable Reamers

Made in nine standard styles and stocked from $\frac{13}{16}$" to 6" dia. McCrosky engineers have had long and wide experience in designing special reaming bars and special purpose reamers.



- McCrosky pin and screw lock forces blade in direction of cutting thrust
- Reamer bodies hardened to resist damage
- Easy and accurate blade adjustment
- Chip clearance in front of cutting edge
- Only six different blade sizes for full range of reamers in any one style

McCROSKY TOOL CORPORATION

Meadville, Pa.

Sales Offices: Chicago, Cleveland, Detroit, Philadelphia. Representatives in Cincinnati, New York, Springfield, Mass., St. Louis, Syracuse San Francisco, Toledo.

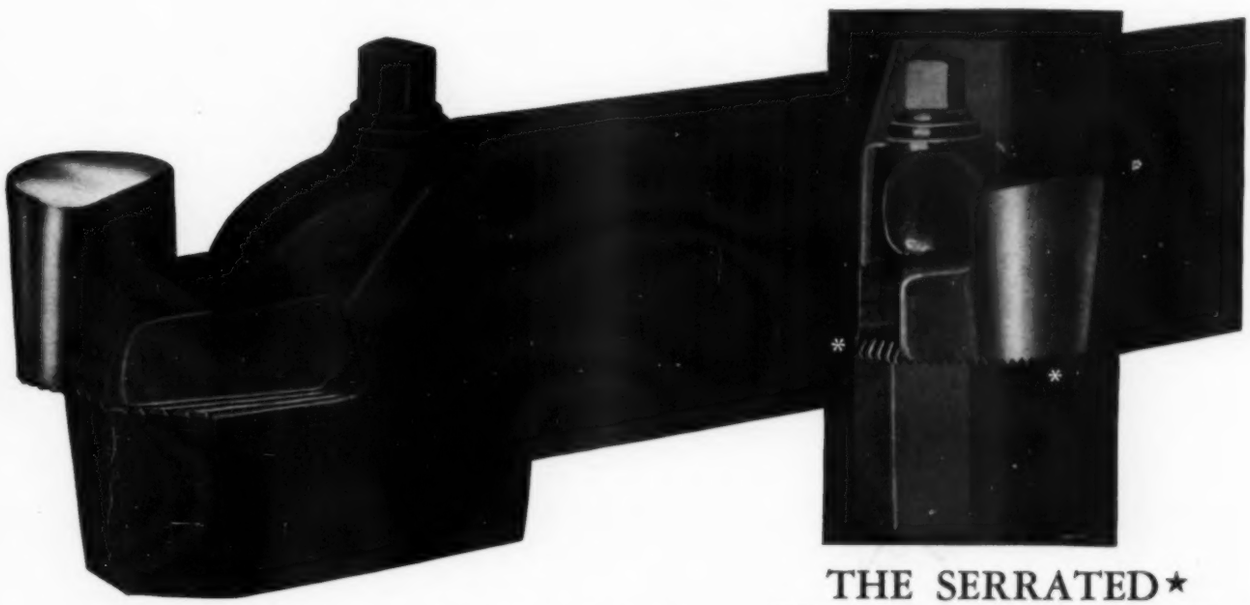
Block Boring Bars . . . Adjustable Reamers and Bars . . . Floating Holders . . . Special Serrated-Blade Cutting Tools . . . WIZARD Quick-Change Chucks . . . Turret Tool Posts . . . Self-Centering Steady-rests.

Send for descriptive bulletins

McCROSKY
COST CUTTING TOOLS

NOW—AFTER 2 YEARS OF HARD BOILED TESTING

Another O. K. Success! ▲ ▲ ▲ ▲



THE SERRATED★ BLADE ADJUSTMENT

so successful in all
O. K. Inserted-Blade Milling Cutters

MAY NOW BE HAD IN O. K. LATHE, SHAPER AND PLANER TOOLS

IN response to a general demand from users of O. K. Inserted-Blade Milling Cutters, we developed these single-point tools, and well over two years ago placed them out on test. They were subjected to hard and varied run-of-shop work in hands other than our own. In performance and bit stock economy, they gave such a brilliant account of themselves that we made them a permanent part of the O. K. System.

The principle is apparent from the illustration. The locking clamp locks the tool bit rearwardly against the slanting shoulder, or angular mating surface, and downwardly into the bottom angular serrated mating surface in the holder. This prevents sidewise or lengthwise tipping of the tool bit without throwing the strain on the locking clamp; at the same time, the mating serrations permit free lateral adjustment.

O. K. Tool Bits are made of the best high speed steel, drop forged, and correctly heat treated for cutting purposes. The holders are of chrome nickel alloy, drop forged, and specially heat treated for toughness. Thus, you invest in the higher priced stock only where needed, *in the bit,* not in the entire tool.

THE O. K. TOOL CO., SHELTON, CONN.

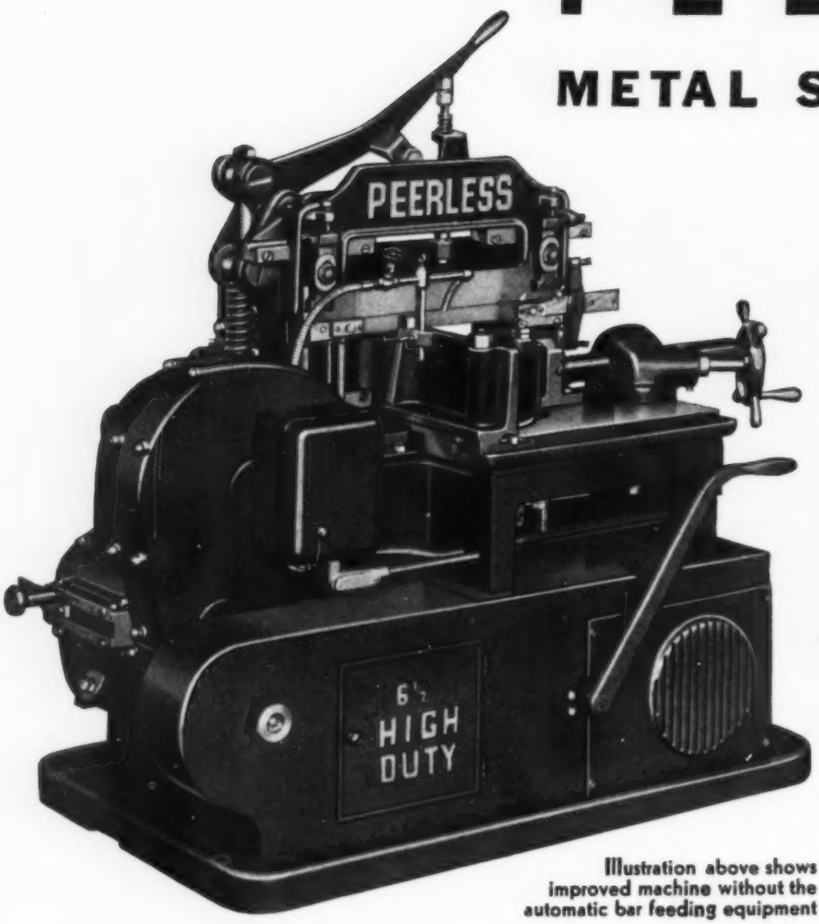
See Us at Booth A-313, Machine Tool Show, Cleveland, Sept. 11-21

THE TRADE OK MARK SYSTEM
OF INSERTED-BLADE METAL CUTTING TOOLS

Announcing AN IMPROVED REAL HIGH DUTY

PEERLESS

METAL SAWING MACHINE



A Sturdy Machine Designed for Fast, Accurate Production Sawing . . .

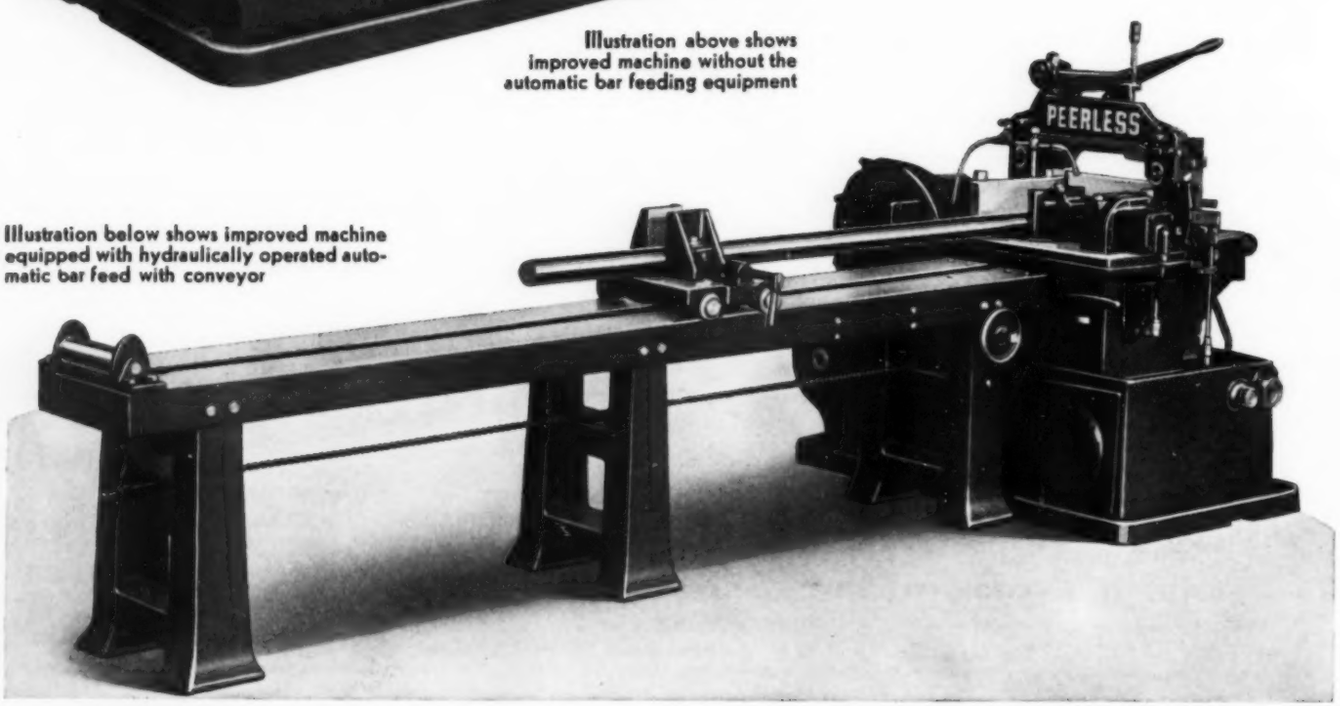
AT THE SHOW

SPACE No. 4

6½" x 6½" Capacity

Illustration above shows improved machine without the automatic bar feeding equipment

Illustration below shows improved machine equipped with hydraulically operated automatic bar feed with conveyor



PEERLESS MACHINE COMPANY • RACINE, WISCONSIN

EVIDENCE of these facts keeps accumulating. Specific records prove that Victor "Moly" hack saw blades can do more work per blade and per dollar than any other blade on the market, that they cut cleaner and faster, that lighter feed can be applied at no lessening of cutting speed, and that breakage can be made negligible. The materials on which these records have been made include the toughest and hardest steels and alloys, all sorts of shapes, thick and thin sections.

The tungsten-content, molybdenum steel of which Victor blades are made, and the special heat treatment they receive sets them apart from and above anything else you have ever tried. A trial order and you will know for yourself.

Write us about your most difficult or expensive hand or power hack saw jobs, give us the name of your supply house and we will see that a type of "Moly" blade is recommended that will give you more production at one-third less cost.

Victor
HAND POWER
"Moly", the original Molybdenum
heavy duty—extra value
HACK SAW BLADE

ONLY THE ORIGINAL MOLYBDENUM HACK SAW BLADES ARE STAMPED: "MOLY"

NRA

VICTOR SAW WORKS, INC. Middletown, N. Y.

5012

Barnes Hack Saw Blades

We make Hack and Band Saw Blades

—We specialize in making quality hack saw and metal cutting band saw blades and nothing else. Barnes factory-trained salesmen specialize in selling the hack or band saw blade which they know will do your work. They know what type of blade to recommend for every job.

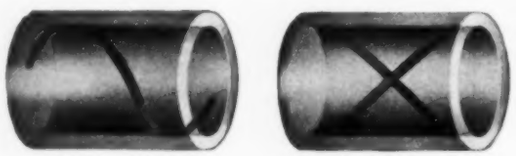
Relieve your mind of hack and hand saw worries. Avail yourself of Barnes' quality and helpful service.

W.O. BARNES CO., INC.
1301 Terminal Ave. Detroit, Mich.
and Leading Jobbers Everywhere

Fischer Machine Co.

Takes pride in announcing

"Twenty years of successful Oil Groover Building"



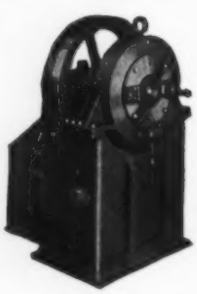
FISCHER MACHINE CO.
310 N. 11th St., PHILA., PA.

RACINE · · Announces A *New* HYDRAULIC SAW · · ·

Pioneers in the application of Hydraulics to Power Hacksaws.

See the complete line at Booth 106

RACINE TOOL & MACHINE COMPANY, RACINE, WIS., U. S. A.



THE TORRINGTON
SWAGING MACHINE
— with 4000 forceful squeezing hammer blows per minute—makes metal tougher and more elastic. Send for booklet—"The Modern Art of Swaging."

The Torrington Co., Excelsior Plant
56 Field Street Torrington, Conn.

CARBON TOOL STEELS

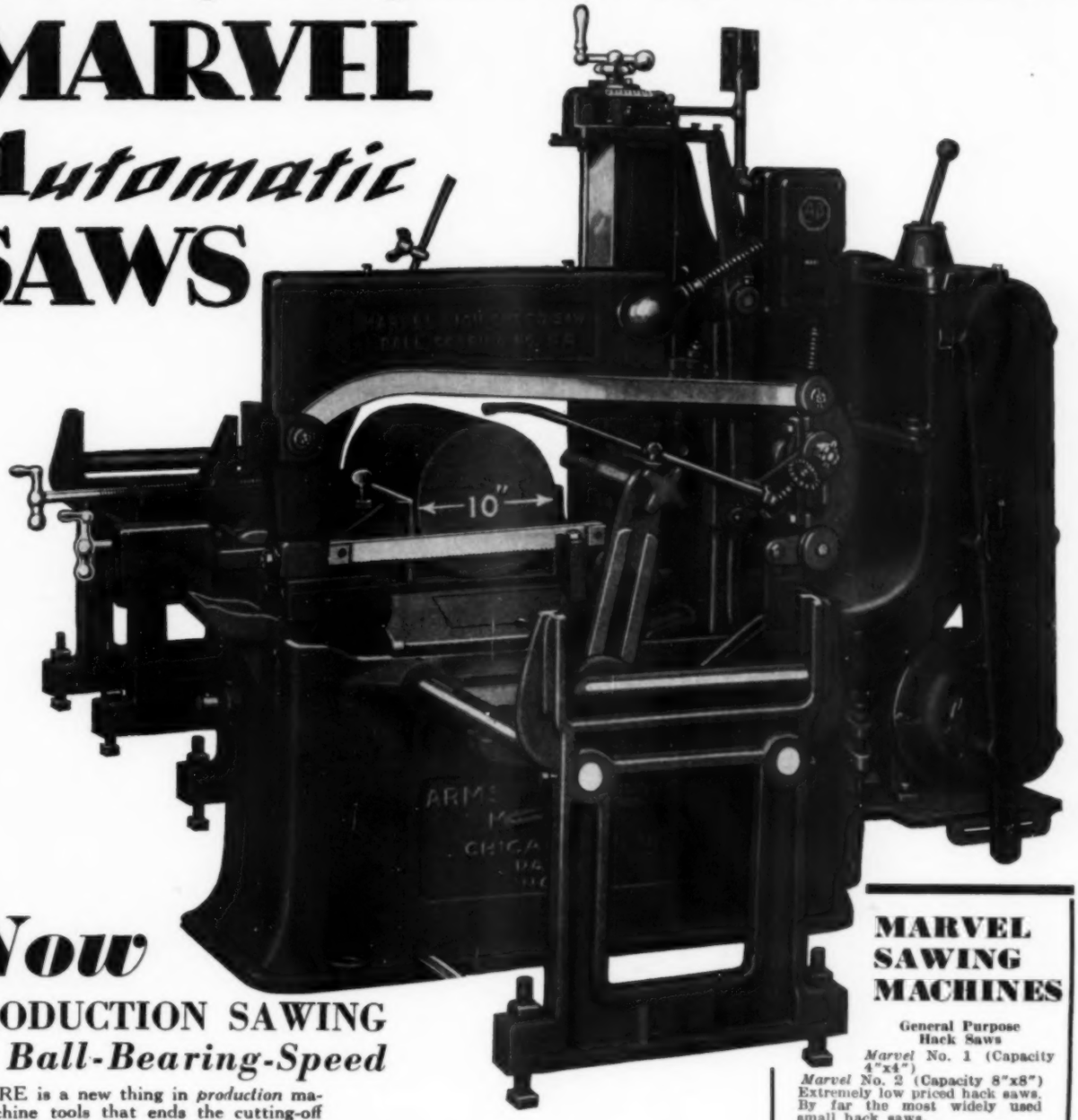
also

High Speed Stainless and Special Alloy Steels

Latrobe Electric Steel Co.
Latrobe, Pa.

Outstanding Among Machine Tool Achievements

MARVEL *Automatic* SAWS



Now PRODUCTION SAWING *at Ball-Bearing-Speed*

HERE is a new thing in *production* machine tools that ends the cutting-off problem . . . Automatic Sawing Machines with the weight and stamina for continuous high-speed operation . . . with ball bearing construction throughout—ball bearing crank shaft, ball bearing blade-frame, ball bearing transmission, ball bearing connecting rods, etc.

Fully Automatic (with automatic bar push-up), require no more operator attention than does an automatic screw machine. Combination (dual) positive-and-friction power screw feeds; direct connected without belts or clutches; quick blade return (shaper ram action); convenient hand screw feed; capable of applying feed loads as high as 1000 pounds (made practical by use of Non-Breakable MARVEL High-Speed-Edge Hack Saw Blades); and many other features of modern development. No wonder these super-sawing machines speed up production, cut costs, increase profits.

For the cutting off of the solid bar stock (gear blanks, for example), no other sawing or lathe cutting-off equipment can even approach the hourly production, the low production cost, and the extremely high efficiency of these new improved MARVEL Ball Bearing Production Machines. They will produce 10 pieces 6" round steel, or 160 pieces 1½" round (other sizes in proportion) every hour FLOOR-TO-FLOOR with no attention from the operator, at an almost negligible cost per piece.

See our private, independent operating exhibit at 634 St. Clair Ave., Cleveland, Ohio, Sept. 10th to 25th (just a few steps from the Cleveland Auditorium); or at the National Metal Exposition of the American Society for Metals, International Amphitheatre, Chicago, Sept. 30th to Oct. 4th) or write for bulletin No. 600.

MARVEL SAWING MACHINES

General Purpose Hack Saws

Marvel No. 1 (Capacity 4"x4")

Marvel No. 2 (Capacity 8"x8") Extremely low priced hack saws. By far the most widely used small hack saws.

Light Duty High Speed Saw

Marvel No. 4B (Capacity 6"x6") Moderate-duty, general-purpose high speed saw that will out-cut all others in its price class.

Heavy-Duty High Speed Saws

Marvel No. 6 (Capacity 6"x6")

Marvel No. 9 (Capacity 10"x10")

Automatic Production Saws

Marvel No. 6A (Capacity 6"x6")

Marvel No. 9A (Capacity 10"x 10")

A New 18" MARVEL Hack Saw

Marvel No. 18 (Capacity 18"x 18"). A new model to be announced and shown for the first time at the National Metal Exposition, Chicago, Sept. 30th. Embodies entirely new principle of blade action, low-pressure hydraulic feed and quick traverse. An extremely heavy "giant" hack saw, about 5,000 lbs. net weight, for extremely large and heavy work.

Metal-Cutting Band Saw

Marvel No. 8 (Capacity 18"x18") The most universal saw built. Handles any type of cut, large or small, with equal facility.

No tool-room is well equipped without one of these "new 1935 model" MARVEL Metal Band Sawing Machines.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

347 N. Francisco Ave., CHICAGO, U. S. A.

Certainly

Built in Two Sizes
No. 8—Capacity 8"x16"
No. 4—Capacity 4" rd. or 7½"x3"

You can Reduce Metal-Cutting Time with the Continuous-Cutting WELLS BAND SAW!

Check These Advantages

- Continuous Cutting
- Cutting time reduced 50% or more
- No excessive heating of blade
- No coolant required
- Cuts any shape or thickness of metal
- Cuts at any angle
- More accurate cutting
- Rigid ball-bearing saw guide
- Rapid adjusting—swivel—two-piece vise
- Long blade life and low blade cost

Here's a machine that will reduce your metal-cutting time —and costs too—by as much as 50% over the ordinary reciprocating type saw. It's a continuous-cutting band saw, with no waste motion—no idle time-consuming strokes.

The endless blade runs cool at all times. No coolant is ever required, and the wear is distributed over the entire blade. Blades last longer and cut more accurately.

The simple, convenient, two-piece vise will take metal of any shape or size up to the capacity of the machine—sheets, bars, or shapes.

Put your metal cutting operations on a profitable basis. Write today for full details on this new time- and money-saving saw. A fully descriptive circular gladly sent on request.

WELLS
MANUFACTURING CO.
315 Seventh Ave., Three Rivers, Mich.

DEALERS WANTED—
WRITE FOR COMPLETE DETAILS

Cross-section of Vari-Pitch Sheave and Texrope Belt adjusted for minimum diameter — low speed.
Cross-section of Vari-Pitch Sheave and Texrope Belt adjusted for maximum diameter — high speed.

Announcing

THE *New* VARI-PITCH TEXROPE SHEAVE

The Allis-Chalmers Mfg. Co. now offers a most important new development in power transmission — the Vari-Pitch Texrope Sheave. ● In this new sheave, by a simple adjustment which takes but a few moments, the pitch can be altered so as to give a variation in speed of from 15 to 25 per cent per sheave; if both sheaves are of this type, the range of variation will be doubled. ● The new Vari-Pitch Sheave permits you to experiment with different speeds to ascertain at just what speed your machinery shows the greatest efficiency; it permits you to take advantage of new higher speed cutting tools; it permits you to make different products, some of which require higher speeds and some lower —and do all this without dismantling and buying new drives, but simply by taking a few moments to make the desired adjustment. ● Vari-Speed Sheaves are made in two types, manual and automatic. The manual type is recommended for applications that require occasional change of speed. For applications that require frequent changes the entirely automatic type is recommended in which speed can be instantly varied to the full range while the drive is in operation.

Vari-Pitch Sheaves will be on Exhibit at the National Machine Tool Show in Cleveland, Ohio

TEXROPE

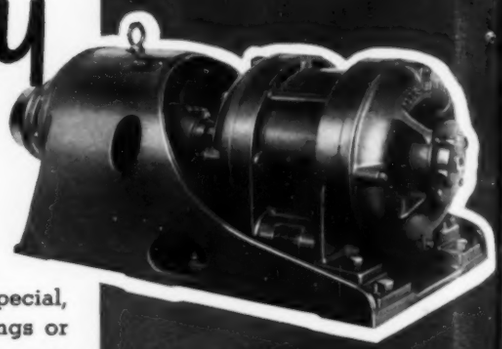
DRIVES

ORIGINATED BY ALLIS-CHALMERS

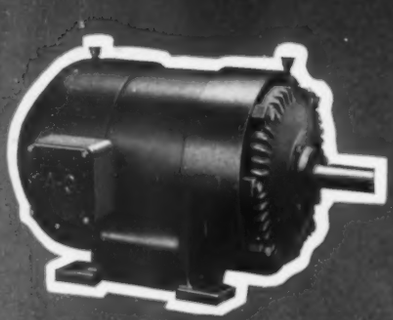
ALLIS-CHALMERS MANUFACTURING COMPANY · MILWAUKEE, WISCONSIN

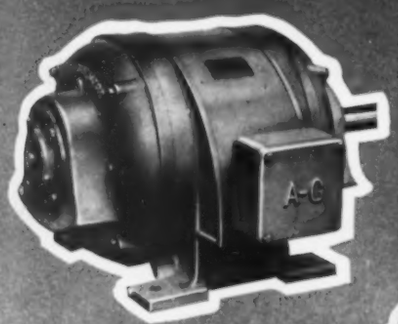
NAME YOUR MOTOR REQUIREMENTS

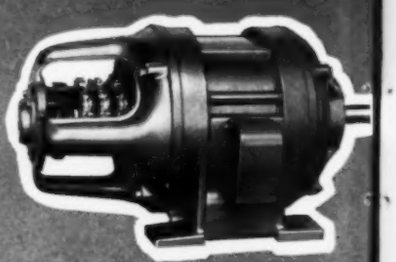
We supply them!

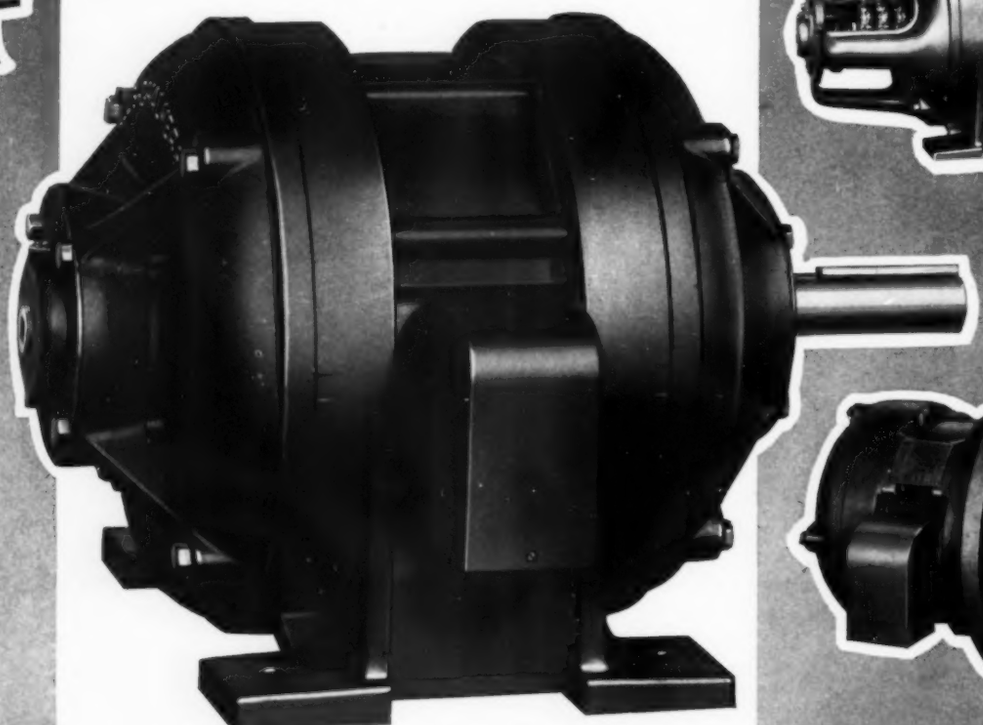


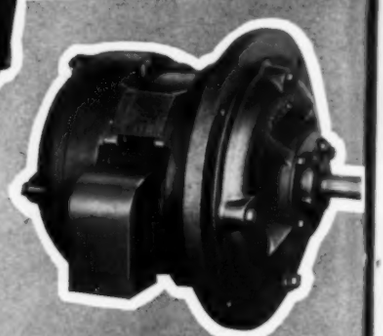
Whether your motor requirements are standard or special, or whether the desired features concern mountings or electrical characteristics makes no difference . . . we supply your motor needs and do so with performance plus. • The Allis-Chalmers plant at Norwood, Ohio, pioneered in applying individual motors to the direct driving of machine tools and in motors built into lathes and other tools. • Allis-Chalmers manufactures the most diversified line of machinery of any company on the American Continent. • All the motor knowledge gleaned from pioneering days to the present time and all the experience acquired in producing motors for its own vast line of rugged power driven machinery is the inheritance of Allis-Chalmers Motors today. That knowledge, that experience and the guiding principle of quality as an ideal are built into every Allis-Chalmers Motor. They are the sturdiest motors on the market—bar none. • Allis-Chalmers district offices in all principal cities and many foreign countries are ready to assist you in all problems of motor application for standard or special drives.











Allis-Chalmers Motors will be on Exhibit at the National Machine Tool Show in Cleveland, Ohio

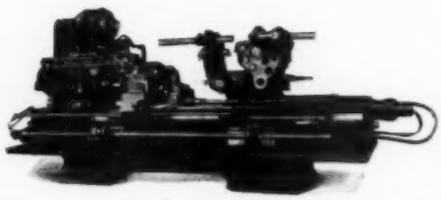
MOTORS

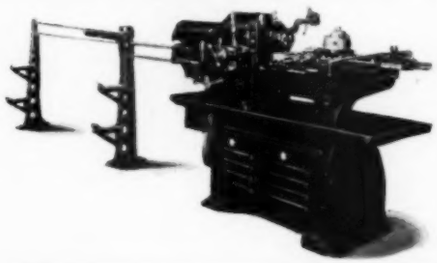
FOR EVERY PURPOSE

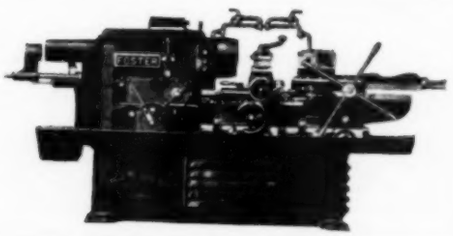
ALLIS-CHALMERS MFG. CO. MILWAUKEE, WISCONSIN

There's something Radically new — at BOOTH 200

FOUR *new* MACHINES by FOSTER







—new—RADICALLY NEW—to meet modern demands for increased speeds and lower operating costs, and to take advantage of the new cutting alloys. Come to Booth 200 and see for yourself the many features so briefly indicated here. Ask Foster representatives to show you how this new—radically new—equipment will fit into your production schedules. Come to Booth 200 at Cleveland—and PROFIT!

No. 3-F INDEXING TURRET TYPE FASTERMATIC

Greater productive capacity, simplicity, dependability. Adjusting blocks for leveling. Nitrided hardened vee ways (over 1000 Brinell). 16 changes of spindle speeds in 4 sets of 4 automatic changes. Bridge type cross slides. Hexagon turret unit. Independent hydraulic feed for each turret face. Feeding mechanism hydraulically operated. 75% less moving parts. Greater feeding range. See it at Booth 200.

THE NEW FOSTER No. 1

For higher spindle speeds. Automatic chuck capacity of $\frac{13}{16}$" may be increased to $1\frac{1}{16}$". Four speed motor in base—2 speed transmission. 8 spindle speeds, 300 to 3600, dial selected. Precision ball bearings and brakes. Hand or cam operated automatic chuck and bar feed. Lever-operated cross-slide, or combination screw and lever operated type. Turret automatically unclamped, indexed, reclamped. Shown at Booth 200.

THE NEW FOSTER No. 7

See It At Our Show!

A 2½" bar capacity ram type universal turret lathe. 16 spindle speeds, dial selected while spindle is in motion, under cut or standing idle. Direct reading dial, no speed plates, no levers, no clashing gears. Adjusting leveling blocks, nitrided hardened vee ways (over 1000 Brinell). Automatic chuck and bar speed, hydraulically operated. Universal type cross-slide. Apron has 9 power speeds, dial selected, doubled by lever to 18 feeds. Automatically lubricated bearings. Hexagon turret automatically clamped, unclamped, indexed. See it at Booth 200!

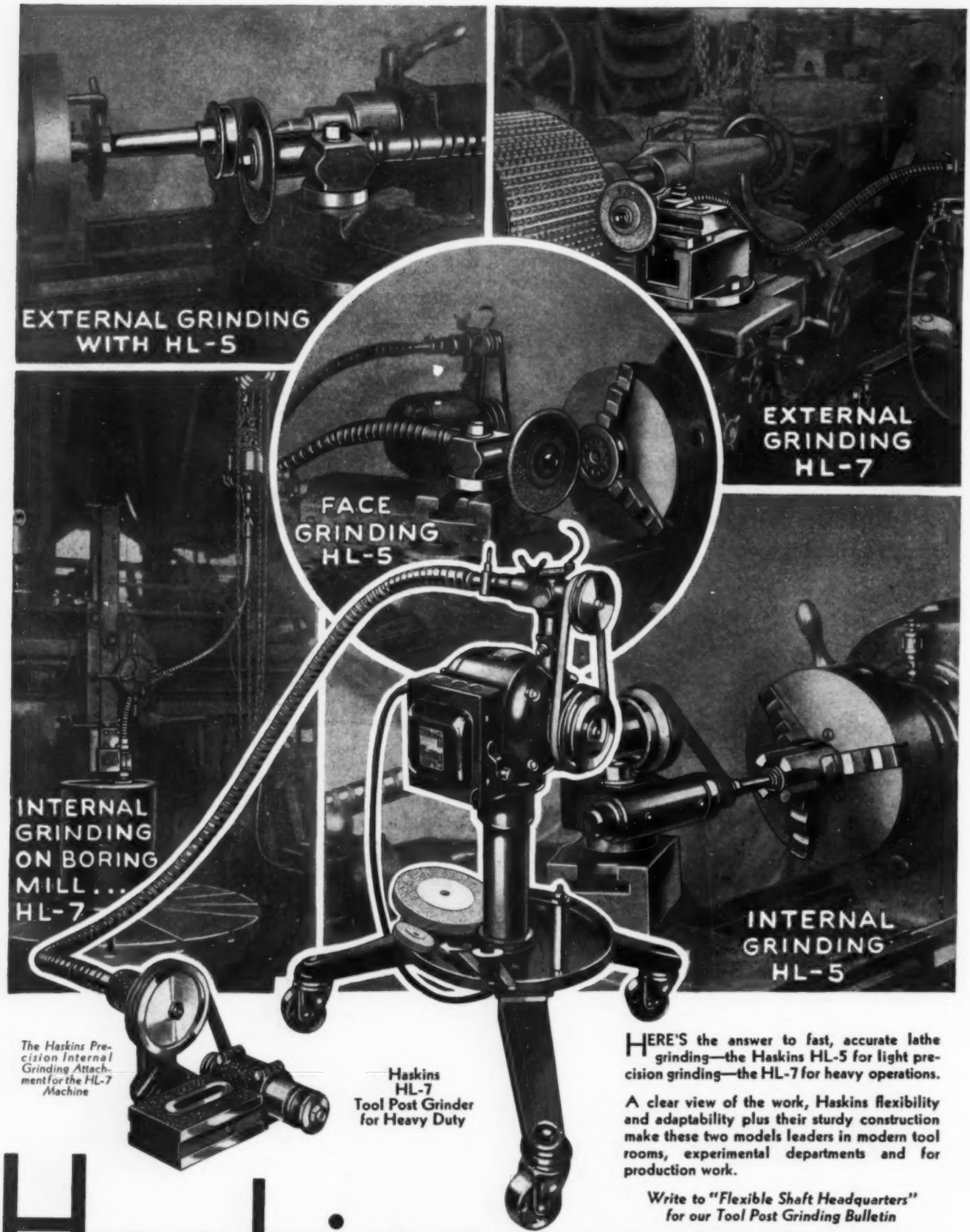
NEW 1½" MOTOR-IN-BASE MACHINE

A radical departure from regular design geared head universal turret lathe. To use new cutting alloys, ample reserve for future developments. Four speed motor has 8 speeds, doubled by drive from back shaft to spindle, making 16 spindle speeds in all (2 ranges of 8 spindle speeds), dial selected. Four gears in head permit unlimited high spindle speeds. Rigid bed construction, nitrided hardened (1000 Brinell) vee ways. Automatic chuck and bar feed *automatically operated*. Cross carriage full universal square turret automatically indexed. Nine power speeds, doubled with lever. In 1¼", 2" and 2½" round bar capacity. Come to Booth 200!

FOSTER MACHINE COMPANY
ELKHART, INDIANA, U. S. A.

greater production at Lower Cost —

FOSTER FASTERMATICS



The Haskins Precision Internal Grinding Attachment for the HL-7 Machine

Haskins HL-7 Tool Post Grinder for Heavy Duty

HERE'S the answer to fast, accurate lathe grinding—the Haskins HL-5 for light precision grinding—the HL-7 for heavy operations.

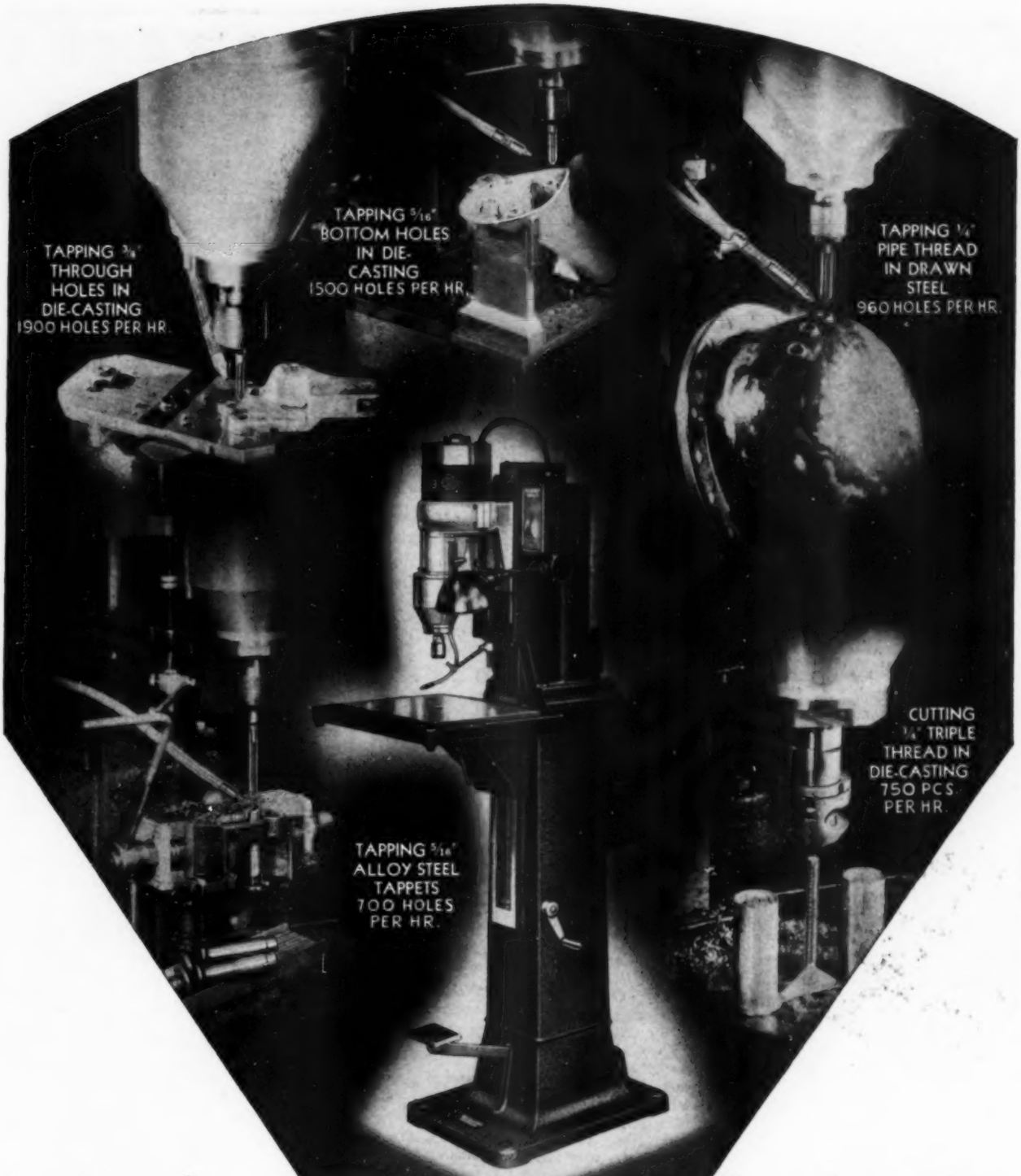
A clear view of the work, Haskins flexibility and adaptability plus their sturdy construction make these two models leaders in modern tool rooms, experimental departments and for production work.

Write to "Flexible Shaft Headquarters" for our Tool Post Grinding Bulletin

Haskins

4630 WEST FULTON STREET
CHICAGO

FLEXIBLE SHAFT EQUIPMENT *with greater adaptability*


TAPPING 3/8" THROUGH HOLES IN DIE-CASTING 1900 HOLES PER HR.
TAPPING 5/16" BOTTOM HOLES IN DIE-CASTING 1500 HOLES PER HR.
TAPPING 1/4" PIPE THREAD IN DRAWN STEEL 960 HOLES PER HR.
CUTTING 1/4" TRIPLE THREAD IN DIE-CASTING 750 PCS. PER HR.
TAPPING 5/16" ALLOY STEEL TAPPETS 700 HOLES PER HR.

HASKINS
CHICAGO

Investigate the adaptability of Haskins Equipment for your requirements

Write for Catalog to

R. G. HASKINS COMPANY • 4630 W. FULTON STREET • CHICAGO, ILLINOIS

CHICAGO RAWHIDE

protect machine-tools from battering and rapid depreciation

few indeed are the machine tools that actually wear out; far more are abused into retirement with slips, slams and glancing blows, with battering, denting and wrecking with machine wrenches and other makeshift "setting-up" tools.

Insure your machine tool investment with Chicago Rawhide Hammers. Their weighted heads permit powerful blows that get work done. Their "balance" gives accuracy—prevents slips and accidents. Their replaceable faces of coiled Java Water Buffalo Hide are tough beyond belief, still are resilient and non-marring. Where operators will not use feeble wooden mallets, twisting lead hammers or clumsy "trick" hammers, they'll reach for a Chicago Rawhide Hammer and use it every time.

protect against "chatter" and destructive vibration

Chicago Rawhide Gears

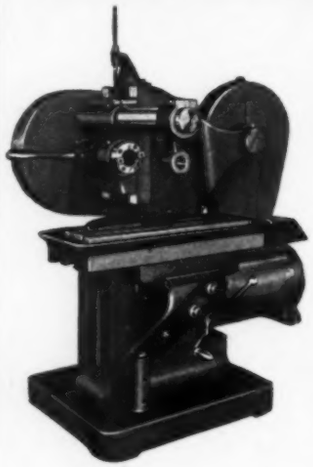
Come in all sizes, shapes and pitches. . . gears or blanks furnished on short notice.

silent . . . long wearing . . . non-chattering and vibrationless, "Chicago Rawhide" Pinions and Gears make every drive a smooth drive. They will deliver as much power as other gears, will take all wear when meshed with metal gears, still will outlast either brass or iron drivers. As manufacturers of gears of all types, of all materials both metallic and non-metallic, we recommend "Chicago Rawhide" Pinions and Gears above all others for smooth, silent operation.

Write for new Gear Catalog

The Chicago Rawhide Mfg. Co.
1292 Elston Ave., Chicago, U.S.A.
New York Boston Philadelphia Pittsburgh
Cleveland Cincinnati Detroit St. Louis

KENT-OWENS No. 26 MILLER

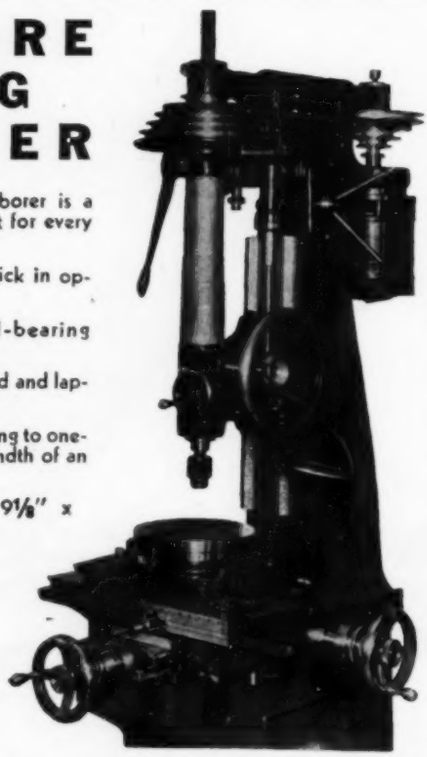


Have you seen this outstanding machine at the Show? The cam controlled table permits any cycle of automatic operations. Also the large table 36" x 8¼" with three T slots is especially adaptable for the use of automatic table fixtures. The No. 26 is the ideal unit for long runs and low cost production milling.

Write for descriptive bulletin

KENT-OWENS MACHINE CO.
958 Wall Street Toledo, Ohio

MOORE JIG BORER



The Moore jig-borer is a sound investment for every tool-room.

Accurate and quick in operation.

Preloaded ball-bearing spindle.

Hardened, ground and lapped lead screws.

Micrometer reading to one-tenth of a thousandth of an inch.

Working range 9⅛" x 14¼".

WRITE FOR FURTHER DETAILS

MARBURG BROTHERS, INC.
ENGINEERS
90 WEST STREET NEW YORK, N. Y.

STILL PIONEERING

The true PIONEER fears nothing and promotes his aims with ACTION.

GEOMETRIC ENGINEERS, fearlessly and untiringly, "Scout Every Field" that's connected with Thread Cutting, and "PIONEER" the problems confronting them in the interests of greater

SPEED, ACCURACY and ECONOMY.

The new Geometric equipment shown here and on exhibit for the first time at **Booth No. 103 at the Machine Tool Show** is: **No. 10 Threading Machine; Circular Chaser Die Head; Tangent Chaser Die Head; EJ2 Solid Adjustable Die Head** for small threads under 1/4" intended for use where you now use solid dies; **3/4" SL Taps.**

Many other new developments will be shown at our Booth. Come in and see us. If you can't be there, write for new bulletins on those tools in which you are interested.

Let GEOMETRIC "Blaze a Trail for YOU" to Bigger Profits.

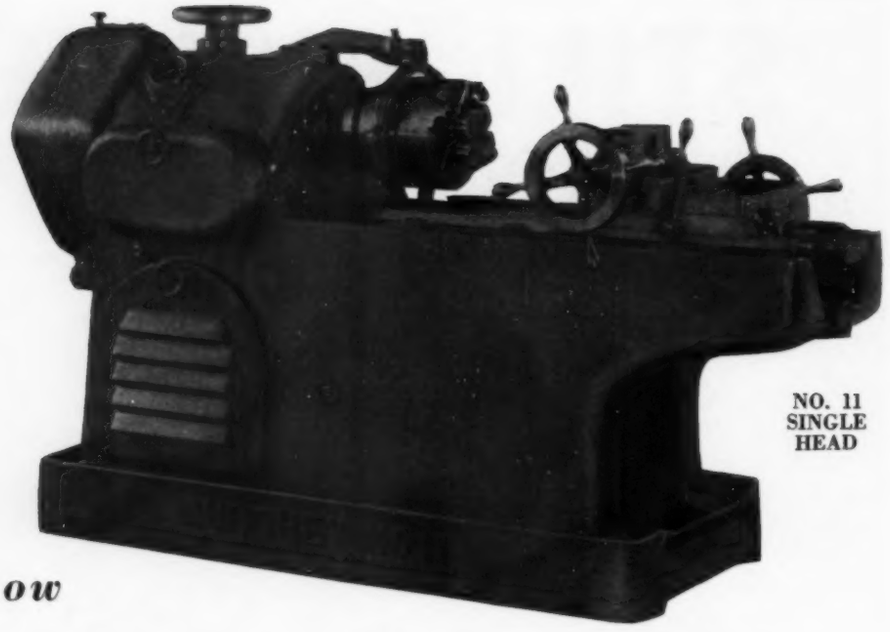
The

GEOMETRIC
TOOL COMPANY

NEW HAVEN, CONNECTICUT

THE NEW MURCHEY THREADING MACHINE

will be running under shop conditions at the Machine Tool Show



NO. 11 SINGLE HEAD

Come and see its profit possibilities at Booth 209

You are cordially invited to visit our exhibit at the Cleveland Show and inspect the new Murchey Machine using Murchey Circular Chasers.

You'll be impressed with the advanced features in the Murchey No. 11 and No. 22 Threading Machines which contribute low cost per thread.

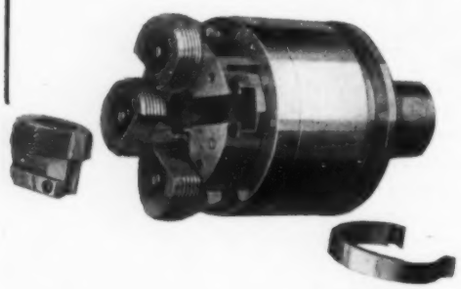
Note the simple and easy operation achieved through accessible and centralized controls—the neat appearance, with motor out of sight in the base of the machine.

Then study the uniformity in the pieces produced and the wide variety of work these machines can handle.

You'll find that speeds are adjustable between 72 and 386 RPM —that lead screw, when desired, is of high carbon alloy steel, precision threaded for accuracy and straightness.

Inspect all these features, watch the machine at work—ask questions pertaining to your own threading problems and our engineers will be happy to answer them.

Make it a particular point to visit Murchey at Booth 209. If you can't go to Cleveland, write us direct for further details.



The Murchey "Circular Chaser" Die Head, used with Murchey Threading Machines, features chasers ground in the thread from the solid. A greater number of threads between grinds is realized as well as more regrinds without loss of accuracy.

The Murchey Tool Line includes Self-Opening Die Heads (Rotating and Non-Rotating), Collapsible Machine and Pipe Taps (Rotating and Non-Rotating), Solid Adjustable Taps and Special Taps.

Tapered Roller TIMKEN BEARING EQUIPPED

THE MURCHEY MACHINE & TOOL CO. DETROIT, MICHIGAN

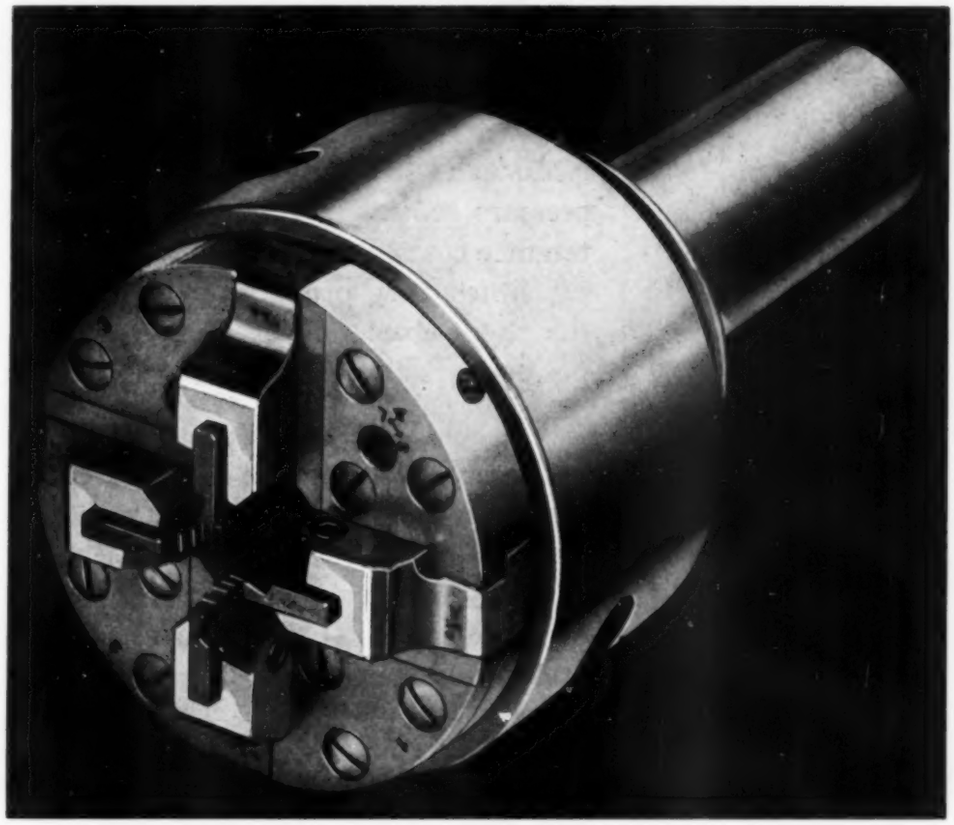
Foreign Agents: Coats Machine Tool Company, Ltd., 15 Elizabeth St., Westminster, London, S.W. 1, England

MURCHEY

At the **BIG SHOW** *in* **CLEVELAND**
be sure to see this amazing–

H & G DIE HEAD

NEW DIE HEAD *with* INSERT CHASERS



A revolutionary Improvement in High-Speed Threading The new H & G Die Head with Insert Chasers, originated and developed by this company exclusively, represents the greatest advance in thread cutting since the introduction of the self-opening die head.

New Low Cost for Chasers Per Thousand Pieces Threaded The very low price at which H & G Insert Chasers may be purchased together with the most extraordinary runs which these chasers give before becoming dull, naturally result in much lower chaser costs per thousand pieces.

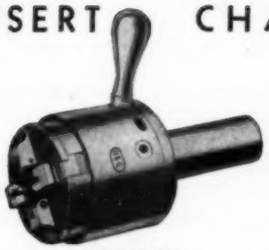
Amazing Gains in Net Production the General Rule The remarkable simplicity of the Insert Chaser Die Head makes the replacement of worn chasers by new a matter of a few minutes. The down time of the machine is less, there are no adjustments to make . . . the daily net production jumps to a new high level. Many plants, after long runs, have concluded the increase is equal to an added half hour for each day for the operator and machine.

Bring your Threading Problems to the Show, Booth 900 Consult us regarding lower threading cost, better quality of threads and higher rates of production.

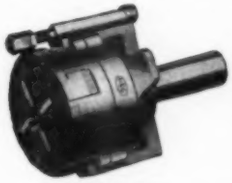
THE EASTERN MACHINE SCREW CORPORATION
20-40 Barclay St., New Haven, Conn.

STYLES OF INSERT CHASER DIE HEADS AVAILABLE . . .

STYLE MM
for rotary spindles.

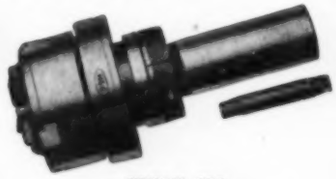


STYLE MS
for hand turret machines.



STYLE DM
for B&S Automatics and other small single spindles.

STYLE IMM
is equipped with improved internal trip for shoulder threading such as for spark plugs.



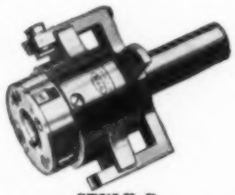
STYLE TM
has receding chasers for cutting superior quality taper threads.

GENERAL PURPOSE DIE HEADS

using the famous H & G Hobbed chasers

STYLE EE (Rotary)
For automatics, threaders, etc., where the die head rotates.

STYLE C
Hand Closing for hand turret machines.



STYLE D
For Brown & Sharpe Automatics and other small machines.

PREMIER SHOWING at CLEVELAND

New Variable Speed Threading Machine
New Solid Adjustable Die Head Using Regular H & G Insert Chasers

Don't miss seeing all of these important developments.

The Eastern Machine Screw Corp.
20-40 Barclay St., New Haven, Conn.

Please send literature indicated with "X"

- ☐ INSERT CHASER DIE HEAD.
- ☐ GENERAL PURPOSE DIE HEAD.
- ☐ THREADING MACHINES.
- ☐ SOLID ADJUSTABLE INSERT CHASER DIE.

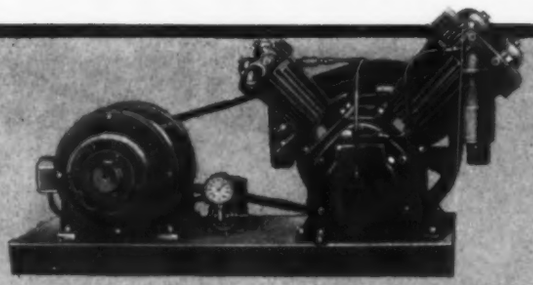
Name .....

Position .....

Firm .....

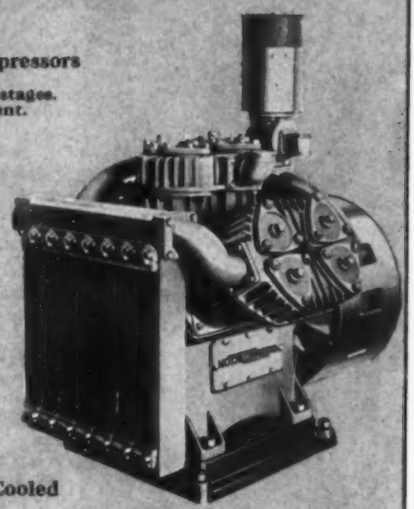
Address .....

These Modern Compressors Will Save Money for You



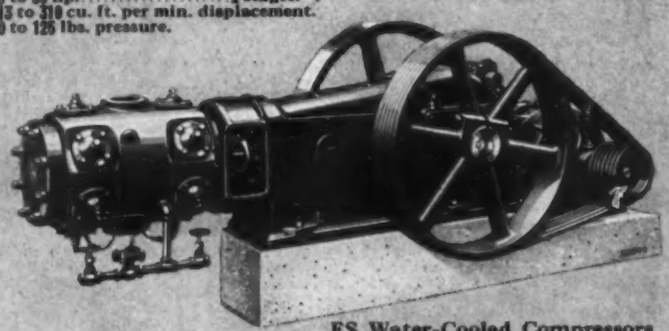
Type 30 Air-Cooled Compressors

¼ to 15 hp. . . . . 1 or 2 stages.
1.2 to 52 cu. ft. per min. displacement.
5 to 1000 lbs. pressure.
Vac. pumps to 53 cu. ft. capacity.



Motorcompressors—Air-Cooled

20 to 60 hp. . . . . 2 stages.
113 to 310 cu. ft. per min. displacement.
80 to 125 lbs. pressure.



ES Water-Cooled Compressors

10 to 125 hp. . . . . 1, 2, or 3 stages.
89 to 1232 cu. ft. per min. displacement.
5 to 2500 lbs. pressure.
Vac. pumps to 2032 cu. ft. capacity.

Modern Ingersoll-Rand compressors reduce power and maintenance costs. When replacing old machines they often quickly pay for themselves out of savings in power costs alone.

Compressed air has a multitude of money making uses. You can take full advantage of these uses with the modern I-R units. They fit economically into almost any production schedule.

There is a machine to fit almost any need—More than 1000 types and sizes make it possible to pick just the capacity, pressure and type of drive to fit your conditions.

There is an I-R branch office near you. Ask them to have an engineer consult with you regarding your compressor problems.

207-1

Other Ingersoll-Rand Products

Aftercoolers
Air Compressors
Air and gas receivers
Air Lift pumps
Cameron centrifugal pumps
Calyx core drills
Condensers
Diesel engines
Gas Compressors
Gas engines
Hoists
Pneumatic tools
Refrigeration units
Rock Drills
Steam pumps
Vacuum pumps

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TOUGH JOBS CAN'T STOP SKILSAW DRILLS!

Try these powerful SKILSAW DRILLS on the toughest jobs you have. Compare them, model for model, with those you are now using. You will find that they outstrip the field in performance, handiness and ruggedness. They deliver an overplus of power that makes the hardest jobs easy.

Every detail of construction reflects the height of precision manufacturing. High grade ball bearings throughout. Extra powerful motors. Die-cast aluminum alloy body,—light and strong. New patented, extra capacity switch with snuff-arc feature. Brilliant engineering and finest materials in every part from handle to chuck.

14 POWERFUL MODELS

See Your Distributor Or Send for Our Catalog

SKILSAW, INC.

3306 ELSTON AVENUE, CHICAGO

SKILSAW HAND GRINDER

WILL SAVE MONEY IN YOUR SHOP!

- SKILSAW Hand Grinder brings big savings on all kinds of jobs, from quick roughing to the most intricate grinding and finest touching up, polishing and filing. It does in a few minutes what would take hours by hand. No task is too tough, no requirement too exacting, no location too difficult for this sturdy, speedy little tool. Take it to the job anywhere,—it plugs into any light socket.

COOL NEW BAKELITE BODY

- Speed 18,000 R.P.M.
- Grease Sealed Ball Bearings Throughout
- Weighs only 3 lbs.
- Powerful Motor
- Efficient Air Filter
- Vitrified Products and Compositions.

Used on Metals, Wood, Stone,

Also Manufacturers of SKILSAWS, BELT SANDERS, BLOWERS, BENCH GRINDERS, BUFFERS

HERCULES

PORTABLE PRODUCTION TOOLS

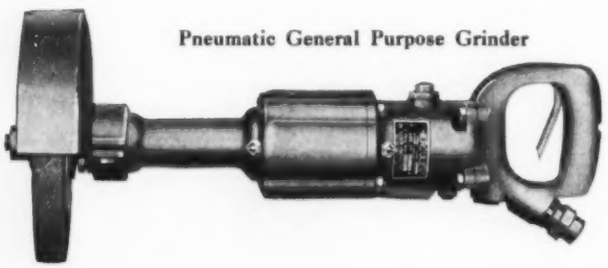
Designed with an intimate knowledge of the tasks for which they are intended—constructed of quality materials and with precision craftsmanship—HERCULES PORTABLE PRODUCTION TOOLS go to the industries of the world with the pledge of *superior service.*

High Frequency Electric "Shockless" Nut Runner

Engineered for Efficiency!

Forethought . . . research . . . vigilance . . . clear thinking guide HERCULES engineers in the manufacture of both the *perfected* rotary type Pneumatic and High Frequency Electric tools. And these guide posts serve equally when they counsel with you regarding the *right* tool for your task . . .

HERCULES PORTABLE TOOLS are built for low cost operation, power, speed, endurance and low cost maintenance. They have this reputation—and they live up to it!



Pneumatic General Purpose Grinder

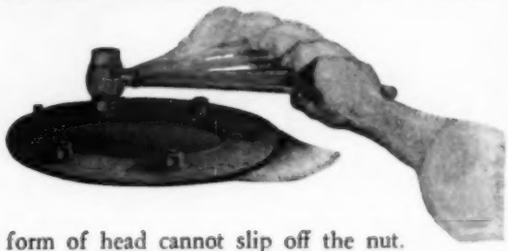
AT THE CLEVELAND MACHINE TOOL SHOW—SEPT 10TH-21ST—we will exhibit a complete line of **Pneumatic** and **High Frequency Electric HERCULES PORTABLE TOOLS,** including several new and unique models—Booth A-407, Arena Section . . . Full descriptive literature is available to those unable to attend as well as those visiting the show.

Manufactured by

THE BUCKEYE PORTABLE TOOL CO.

DAYTON, OHIO, U. S. A.

WORKS ON A QUICK STRAIGHT-AHEAD RATCHET MOVEMENT



Its socket form of head cannot slip off the nut.
None of the quarter turn and a fresh hold of the old-fashioned open-end wrench.

The new metal now being used in Handles, Heads and Pawls enables the "FAVORITE" Wrench to stand up under harder and rougher usage.

The "FAVORITE" does away with all the lost motion of nut turning.

A TIME-SAVER

Can be used in narrower places than an ordinary wrench.

Each head can turn two different-sized nuts—one in each end.

Opening in head allows bolt to pass clear through.

SPEED UP NUT TURNING

with the

FAVORITE REVERSIBLE RATCHET WRENCH

A BLOW WITHOUT A DENT

BASA HAMMER

Send for full particulars.

GREENE, TWEED & CO.
SOLE MANUFACTURERS
109 DUANE STREET NEW YORK, N. Y.

TAKE NO CHANCES OF DAMAGING FINISHED SURFACES

USE THE

BASA HAMMER

with

REMOVABLE FACES

(Rawhide, Copper or Babbitt)

Made in five sizes

In finishing and assembly work it is often desirable to use a hammer that can strike more than one kind of blow.

Faces Cannot Rattle in Head, or Fall Out

The clamping jaws of the "BASA" Hammer can be set up to take care of shrinkage or wear of the Faces.

A soft-faced hammer of improved design and construction.

The Rawhide, Copper and Babbitt Faces make it possible to adapt this Hammer to any class of work.

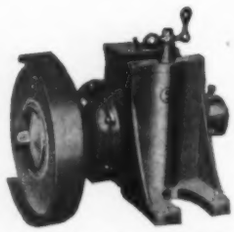
A Hammer that will strike blows of varying hardness without marring the surface.

HEAVY DUTY BUFFER AND POLISHER — G.E. Motors. SKF Ball Bearings. ½ H.P. to 15 H.P. 1750 or 3400 R.P.M.

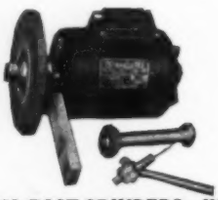
No. 50 HIGH SPEED-SNAGGING GRINDER—Adjustable Speed. Maintain 9000 S.F.P.M. 'V' Cog Belts. 4" dia. 74" long nickel steel shaft.

Horse-power	Dia.	WHEELS Face	Hole	No. of "V" Belts	Weight Net
7½	20"	2" to 4"	10" or 12"	3	3150 lbs.
10	24"	2" to 4"	10" or 12"	3	3776 lbs.
15	30"	2" to 4"	10" or 12"	4	4048 lbs.

PROPER SPEED BUFFER AND POLISHER — 3 H.P. to 20 H.P. Any spindle speed. 'V' Cog Belts. Also variable speed. 56" to 108" overall length of spindle.

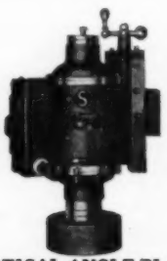


ANGLE PLATE GRINDERS —Also with horizontal feed. ¼ H.P. to 10 H.P. sizes.



TOOL POST GRINDERS—With or without hand feed. ¼ H.P., ½ H.P. 6", 8" wheels.

HEAVY DUTY GRINDERS —¼ H.P. to 15 H.P. sizes. Adjustable wheel guards.



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DISC GRINDERS. RING WHEEL GRINDERS. INTERNAL GRINDERS. PORTABLE ELECTRIC SNAGGING GRINDERS. DIE GRINDERS. EXHAUST BLOWERS WITH AIR FILTERS. PORTABLE ELECTRIC DRILLS.

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VISE

For DRILL PRESS

With and Without Jig Attachments.

Jaws 6", 9" and 12" Long

Often used on Miller, Shaper, Planer

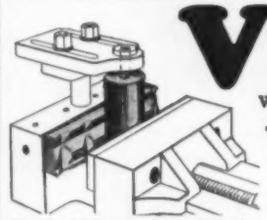

Fig. 3. V-Jaw for Round Work

Attachments mean much drilling — small Jig cost.

Fig. 2 Without Jig Attachments

DRILL

SPEEDER

or High Speed Drilling Attachment

Drives Small Drills up to Proper Speed

INCREASE THE SPEED 3 TIMES

Suits Straight or Taper Shank Drills up to ¾" with Speeds to 3,000 R.P.M. For use in Drillers from 20-in. to largest Radial.

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Swivel Lugs

Shank made to suit turret

For Turret Lathes

Operates like screw Die

Adjustable to any size within its capacity.

TWO SIZES--TWO STYLES

Straight Cut Knurls in Swivel Lugs Produce all Standard Knurling.

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— NEW —

ELECTRIC OPERATED CHUCK

High Torque Electric Wrench, Latest Type of Independent and Scroll Chucks for Taper Spindles.

UNION MANUFACTURING CO.

NEW BRITAIN ● CONNECTICUT

KEYSEATING MILLER

With this miller you can mill keyseats with parallel sides and in alignment with the axis of the bore. Also inquire about the Oilgrooving Miller.

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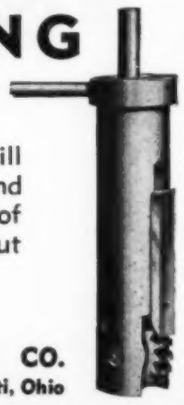


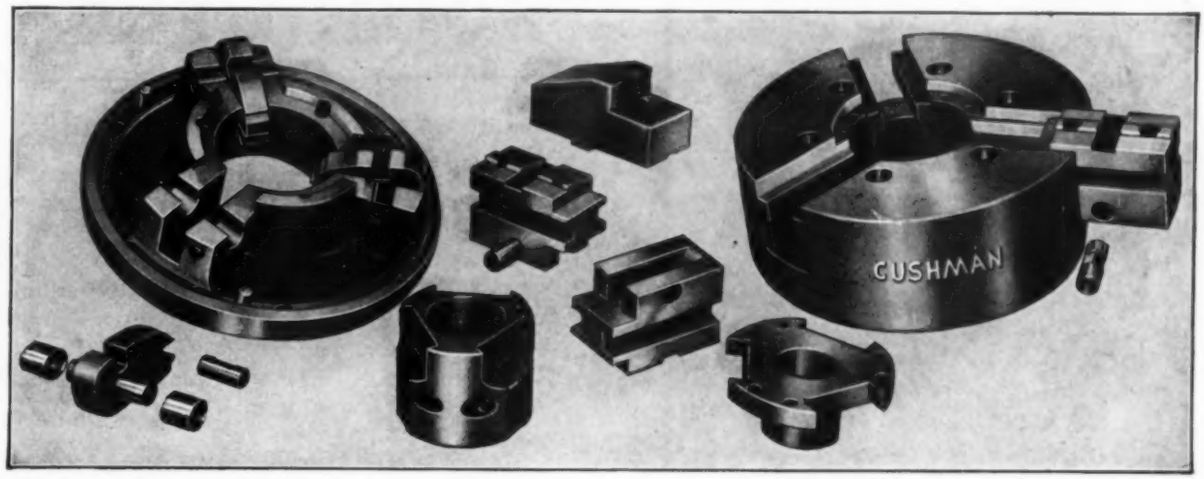
NATIONAL MACHINE TOOL CO.

2272 Spring Grove Ave. Cincinnati, Ohio

NEW THINGS

AT THE MACHINE TOOL SHOW!

Many new machines and tools which mean real operating profits have been developed since the last National Machine Tool Exposition in 1929. Therefore, you will want to take in the 1935 Exposition in Cleveland, September 11 to 21. While you are there drop in at The Cushman Booth and see some of these new products in action.



CUSHMAN CHUCKS • BOOTH 410-E

Mr. H. W. Hultgren, Assistant Secretary will be in charge, and he will be glad to show you the following Cushman products:

1. **"NO. 730 CUSHMATIC CHUCK"** — the electric power chuck for engine and turret lathes, etc. It will be shown operating under its electrically controlled No. 70 rotating Power Unit. (Bulletin 120-C).

2. **"NO. 4-C-7 PULL-PUSH-POWER"** — the new power unit which converts rotary motion to straight line motion. This is an electrically operated Power Unit which will be demonstrated in action with a clevis connection on a frame designed for the purpose. (Bulletin 127).

3. **"HAND OPERATED LATHE CHUCKS"** — Specimens of several Cushman light, medium, and heavy duty types. Note particularly the new standardized backs. (Bulletin 48).

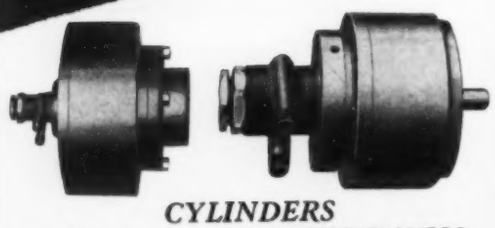
•

We will be glad to mail you any of these bulletins, and hope you will stop and see us at the Cleveland Show.

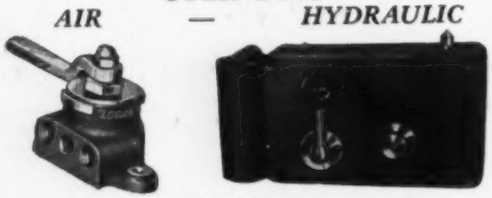
THE CUSHMAN CHUCK COMPANY • HARTFORD • CONN.

Where Production moves FASTEST—

YOU'LL FIND "LOGAN" EQUIPMENT



CYLINDERS
AIR — HYDRAULIC



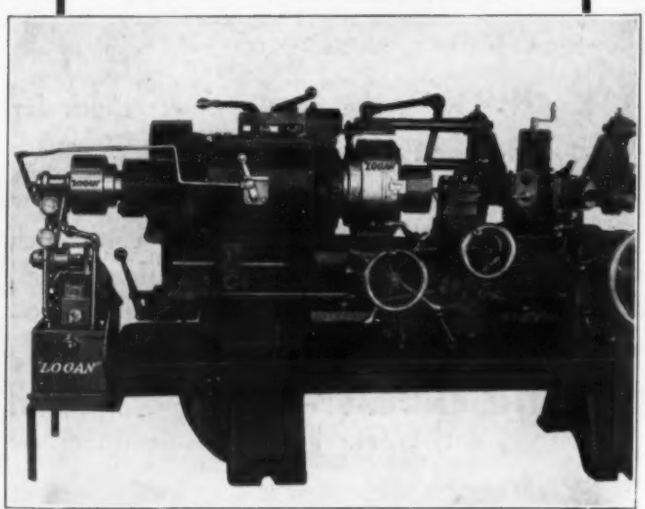
VALVES
AIR — HYDRAULIC

CHUCKS
AIR and HYDRAULIC

Visit us at the Machine Tool Show Cleveland—Booth 313

IN the plants that are setting records for low-cost production you'll find Logan Air or Hydraulic devices being used. Why increase your floor-to-floor time with old-fashioned mechanical chucks when you can have all the advantages of Logan Air or Hydraulic work-holding devices at a cost that will soon be repaid in time savings.

Logansport manufactures a complete line of power devices, cylinders, and valves for both hydraulic and air operation of machine tools and other equipment. Should your requirements be of a special nature, our experienced engineers will be glad to consult with you in the design and construction of equipment to suit your needs.



"LOGAN" Standard Electric-Hydraulic chucking device adapted to Warner & Swasey Turret Lathe. Consists of 15-inch, three-jaw chuck, Model HV Rotating Type Cylinder and Model 5020 Electric-Hydraulic Power Device.

"LOGAN" PRODUCTS

Everything in
Air and Hydraulic Equipment

Electric Hydraulic Power Units
Rotating and Stationary Hydraulic Cylinders
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Special Air and Hydraulic Cylinders
Hand and Foot Control Air and Hydraulic Valves
Air and Hydraulic Chucks of all types
Air and Hydraulic Arbor Presses
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LOGANSPORT MACHINE COMPANY

LOGANSPORT INDIANA

"THE LOGANSPORT MACHINE CO. LOGAN LOGANSPORT, INDIANA, U.S.A."

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Where the machine meets the work. That's where things begin. The success of a machine. The effectiveness of a tool. And JACOBS CHUCKS are the accepted means of bringing the machine, the tool and the work into effective, profitable contact.

Improved. Better than ever. New and tougher steels. Refined design of jaws and locking ring. Even the key has not escaped the march of progress — it gives greatly increased leverage; is easier to use and is rust-proofed.

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AIR

MAKE IT AND USE IT MORE EFFICIENTLY

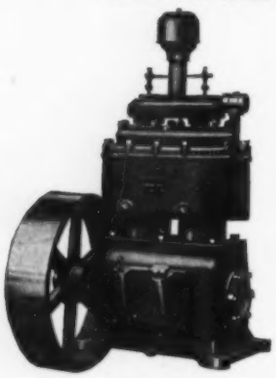
And At Lower Cost With

CURTIS COMPRESSORS AIR HOISTS, CRANES

PRODUCTS OF EXPERIENCE

Curtis products are made by a firm with 81 years of successful manufacturing experience. The Curtis plant, with its up-to-the-minute equipment and latest production methods, covers 20 acres. Dun and Bradstreet rating AaA1 over $1,000,000 highest credit. "A Curtis product is not likely to become an orphan."

CURTIS AIR POWER CRANES



½ to 10 ton capacity. 10′ to 40′ span. Cost less to purchase and install than other types of power cranes. Labor cost, depreciation and maintenance are less also. Skilled operators not required. Immune to abuse or overloads. Spot to a hair's breadth. Hoisting and lowering speed are variable to suit use. Pressed steel ends, Roller Bearing wheels. Less dead weight. Cannot be damaged by exposure, dust, steam, acid fumes, etc. No servicing required for years at a time.

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A product of 41 years' experience in compressor building. Precision-made. Carbon-free disc valves. Centro-ring oiling. Timken Bearings. A reputation for staying on the job. Capacities up to 360 C.F.M.

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Cost little more than chain blocks. Lift is 65 ft. per minute against 5 ft. for chain block. Other power hoists usually cost twice as much, require from two to five times as much maintenance. Adaptable to push, pull, or lift operations, up to 10 tons.

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CURTIS COMPRESSORS • AIR HOISTS I-BEAM CRANES AND TROLLEYS

CM5-106

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New Low Lift Trucks

High Lift Tiering Platform Trucks

New Low Lift Trucks with Crane Attachments

New —DEPENDABILITY —ECONOMY —VERSATILITY *in the entire* "AUTOMATIC" *Line*

LATEST ENGINEERING Many engineers, each an expert in the application of material-handling equipment, re-designed the entire AUTOMATIC line. Now, every part of each AUTOMATIC truck represents the utmost in today's engineering. When you inspect these trucks you will see the results of advanced thinking—you will see what a modernization program, backed by engineering excellence, has accomplished from "tip to toe"—how it has brought about a wholly new era in material handling.

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NEWEST FEATURES Features entirely new in truck design—features that are exclusive are found all through the operating mechanism—throughout the frame and in the steering gear. POWER STEER is one of the outstanding industrial truck developments. It eliminates all manual effort and means faster moving of equipment and loads. All AUTOMATIC features contribute toward a new economy never before possible.

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"AUTOMATIC" TRUCKS *to Cover Every Modern Need of the Machine Tool Industry*

NEW LOW COST POSSIBILITIES FOR YOU There is an "AUTOMATIC" Truck to solve every intra-plant, heavy-duty transportation and material-handling problem. The modern "AUTOMATIC" trucks, tractors, cranes, and trucks of special design are built for greater efficiency and lower operating costs than any previous types. New performance records are being established by "AUTOMATIC" trucks under varying conditions and from coast to coast. Your material-handling situation is a most important consideration right now in the matter of costs and in that regard it is good business to investigate just what "AUTOMATIC" can do for you.

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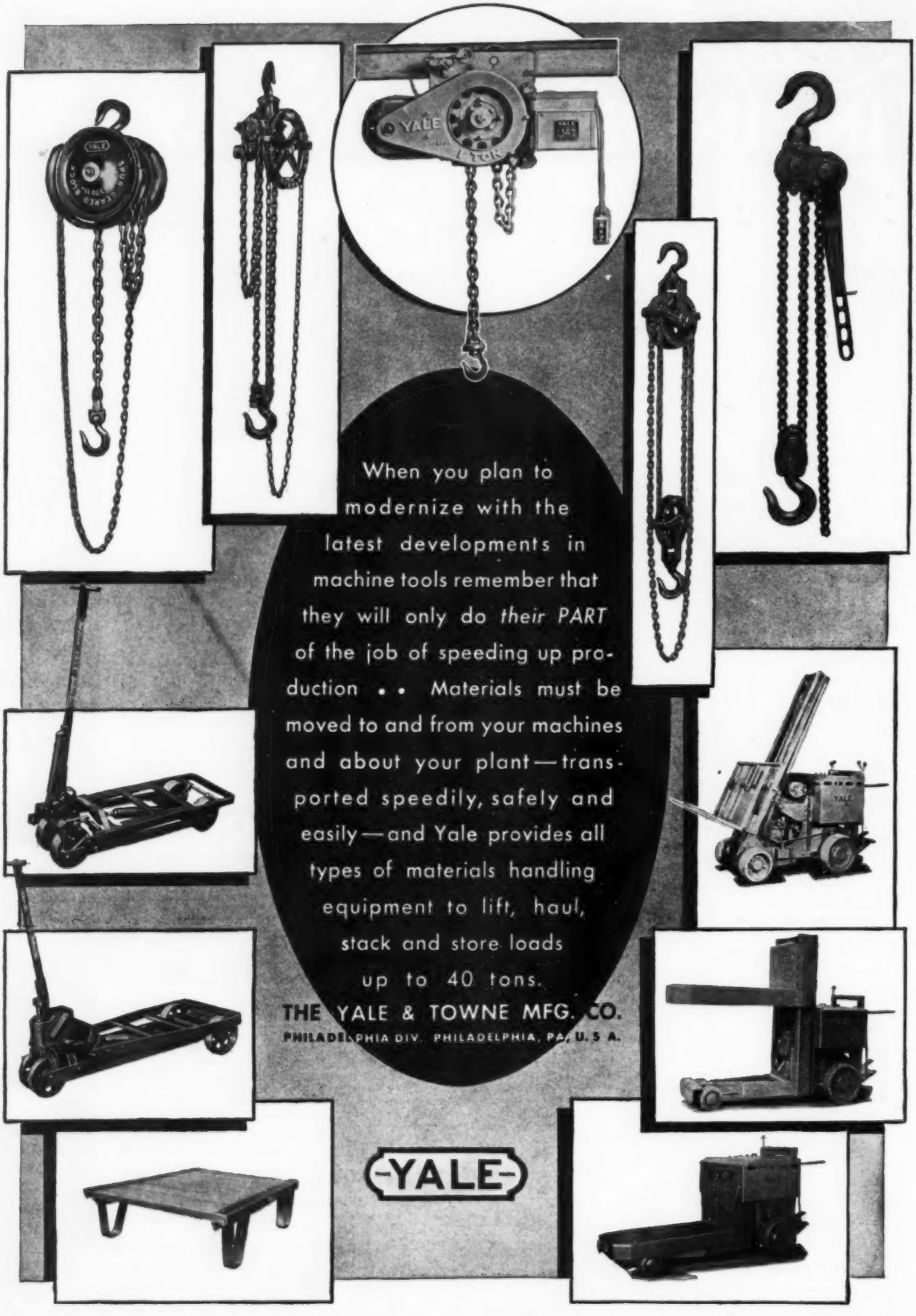
TRADE **AUTOMATIC** MARK

Electric and Gas-Electric
MATERIAL HANDLING EQUIPMENT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When you plan to modernize with the latest developments in machine tools remember that they will only do *their PART* of the job of speeding up production • • Materials must be moved to and from your machines and about your plant—transported speedily, safely and easily—and Yale provides all types of materials handling equipment to lift, haul, stack and store loads up to 40 tons.
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J&L PRECISION SHAFTING

now straightened by a new exclusive process

STRAIGHTNESS, always an outstanding characteristic of J & L Precision Shafting, is now made more certain than ever by a new exclusive J&L process. This straightening process, developed by J & L, involves new machines especially built for Jones & Laughlin to Jones & Laughlin's own specifications.

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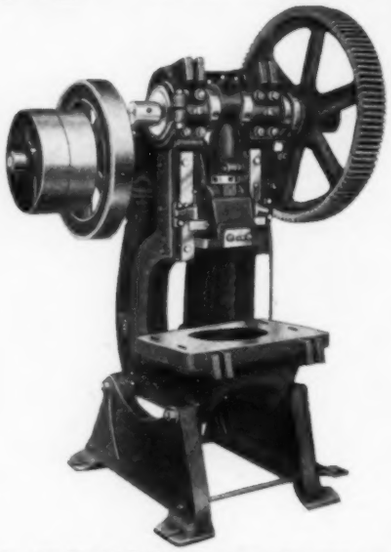

Perkins Junior A.C. Motor Driven Inclinable Press, complete, F.O.B. Warren, Mass. $75.00

No. 500 Model B Geared Press, including Safety Clutch, one-man lifting device, Felt Wiper and Bolster Plate. F.O.B. Warren, Mass. $725.00

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Easily Installed
Increased Efficiency
Instant Control
Smooth operation
Long Wearing

The Cullman... Lathe Drive

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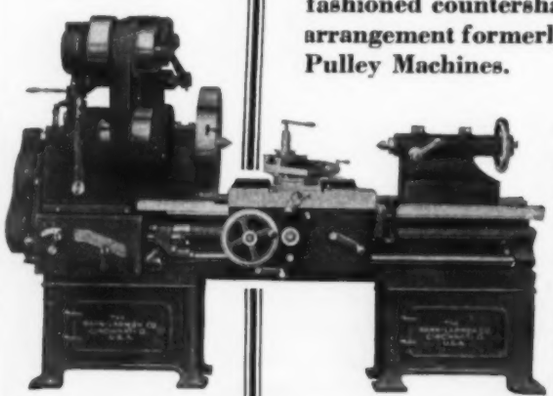
This individual Electric Motor Unit was designed by Cullman to eliminate the old-fashioned countershaft overhead belting arrangement formerly used to drive Cone Pulley Machines.



The Cullman Lathe Drive will increase the efficiency of your shop. Original cost is low, and it is long wearing. Operation is easy and safe, and control is instantaneous. Any lathe, shaper, milling, or screw machine now being driven by overhead belting can be modernized by the installation of a Cullman Drive.

MADE IN SIZES FOR MOTORS RANGING FROM ½ to 7½ H.P.

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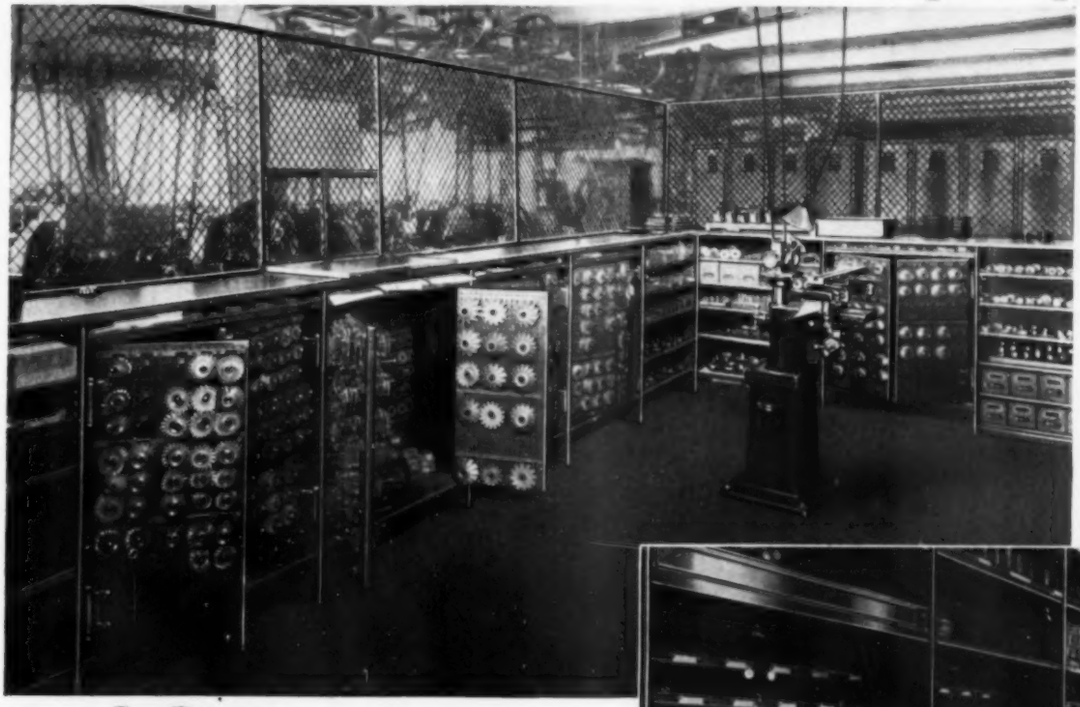
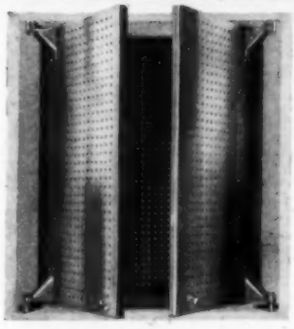


Counter-high shelving with milling cutter inserts—Barber Colman Co., Rockford, Ill.



Milling Cutter Insert

Drill and Reamer Storage Insert

Drills, reamers, taps and dies in orderly storage—C. A. Gray Co., Cincinnati, Ohio

MANY a shop superintendent feels that he is saving money by *not* installing specially designed shelving. Lyon shop planning men have been able to prove the opposite is true in many notable cases.

Why? Because Lyon Steel Tool Room Equipment is designed primarily to save money—particularly in tool handling. The only valuable tool is the one that is *in good condition* and *in the right place* when needed. Otherwise the money spent for it is at best, a frozen asset.

Installation of carefully specified Lyon Steel Shelving will therefore quickly repay its cost by (1) providing an absolute check on all tools (2) minimizing the chances of lost tools and (3) doing away with time wastes in searching for misplaced tools. Send the coupon for Bulletin 105-C illustrating the many types and typical floor plans.

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LYON *STORAGE EQUIPMENT* *Service*

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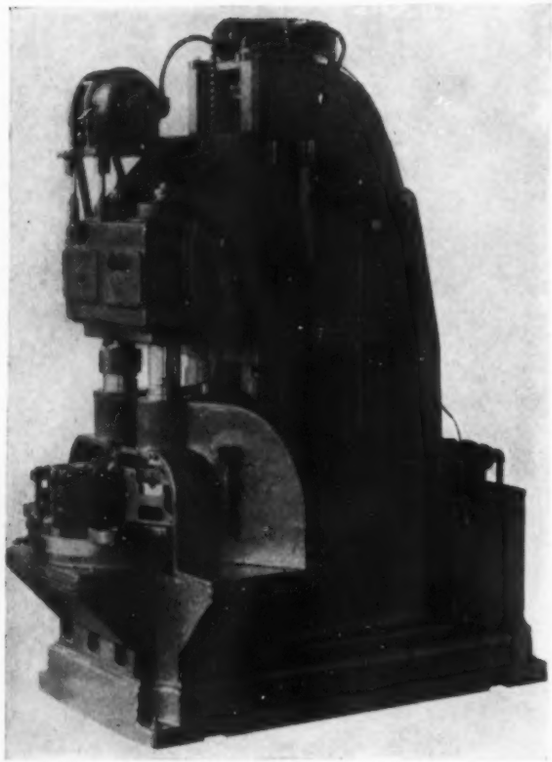

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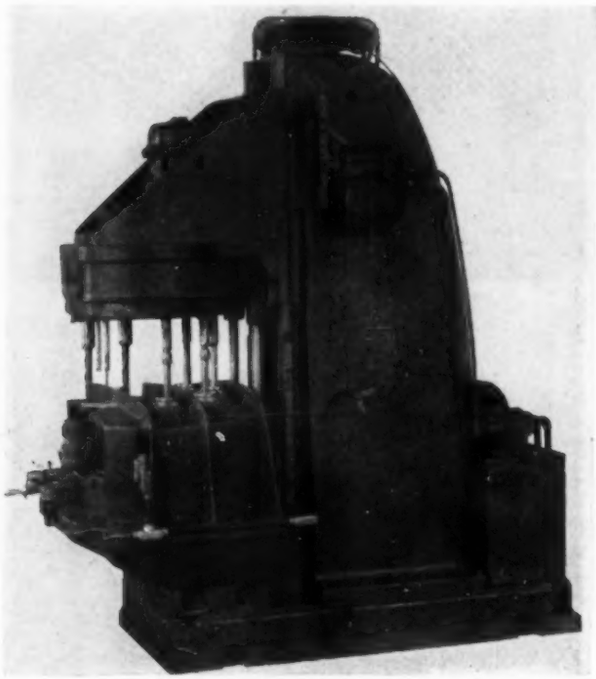
For Rough and Finish Boring and Facing compressor housing bottoms and similar work. Fixed Center Head is completely enclosed, has forced feed lubrication, and is driven by Hydraulic Feed Cylinder; Texrope Drive. Spindles are driven by Cone-type Worm Gears and run in Timken Bearings. Three-station, 30" circular hand indexing table; fixtures for positioning and clamping and Hydraulic Feed made to requirements. Production capacity 80 castings per hour at 85% efficiency.



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VERTICAL EIGHT SPINDLE DRILLING & BORING MACHINE....

For Core Drilling and Rough and Finish Boring cylinder bores and drilling 3/8" hole in top of compressor housings, and similar work. Direct motor drive, fixtures and Hydraulic Feed to requirements. Production—60 castings per hour at 85% efficiency.

DEFIANCE

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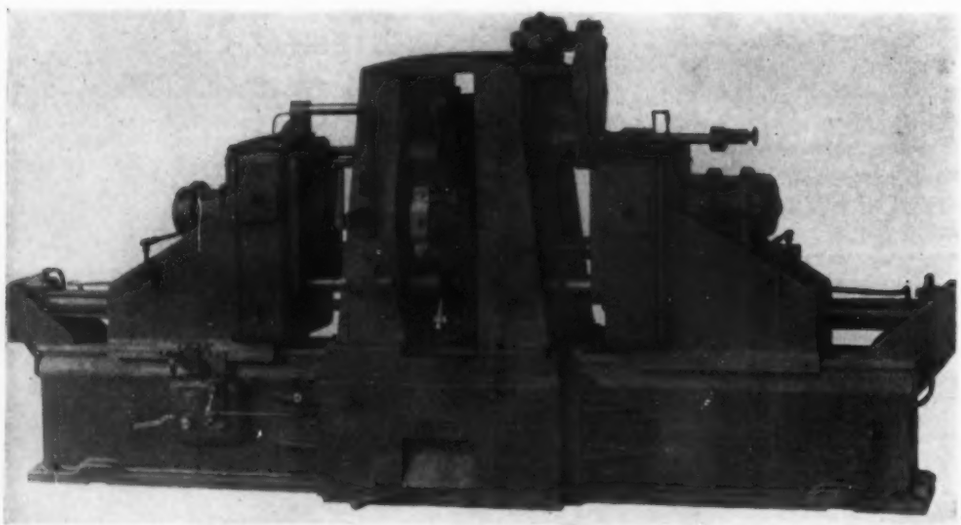

For rough, semi-finish, finish boring, rough and finish facing and line reaming the crankshaft bore of compressor housings and similar work. Direct motor drive, fixtures and Hydraulic Feed to requirements. Production — 68 castings per hour at 85% efficiency.

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WANTED—A machine designer experienced in the field of machine tool or automatic work. Ingenuity and inventiveness essential. P-886, American Machinist, 330 West 42d St., New York City.

Continued on page 301

EMPLOYMENT SERVICE

SALARIED POSITIONS, $2,500 to $25,000. This thoroughly organized advertising service of 25 years' recognized standing and reputation carries on preliminary negotiations for positions of the caliber indicated, through a procedure individualized to each client's personal requirements. Several weeks are required to negotiate and each individual must finance the moderate cost of his own campaign. Retaining fee protected by a refund provision as stipulated in our agreements. Identity is covered and, if employed, present position protected. If you have actually earned over $2,500, send only name and address for details. R. W. Bixby, Inc., 266 Delward Bldg., Buffalo, N. Y. (A.M.)

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PRODUCTION Manager or Factory Supt., age 44, with wide range of experience in radio and refrigerator manufacturing, porcelain welding, brazing, die casting, planning, Costs, etc. At present employed, desires to make connection with reliable and financially sound concern; location 100 miles radius Chicago. PW-864, American Machinist, 520 No. Michigan Ave., Chicago, Ill.

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TOOL SUPERVISOR available. Toolmaker, tool designer, methods man will cut your costs and solve your manufacturing troubles with simple, effective tools. PW-882, American Machinist, 330 West 42d St., New York City.

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STRUCTURAL engineer graduate, excellent draftsman; knowledge of die, tool, machine and bridge designing. Experienced in surveying, drafting, fabricating, erecting steel mill structures and machinery. PW-885, American Machinist, 520 No. Michigan Ave., Chicago, Ill.

PATENT ATTORNEY

PATENTS — Booklet free. Highest references. Best results. Watson E. Coleman, Patent Lawyer, 724 Ninth Street, Washington, D. C.

REPRESENTATIVES AVAILABLE

Covering New England States

Manufacturer's agent wants additional lines. RA-860, American Machinist, 330 West 42d Street, New York City.

Small Tool and Hardware

Southern New England manufacturers' agent with seventeen years' selling experience wants additional lines. RA-852, American Machinist, 330 West 42d Street, New York City.

Additional "Opportunity" ads on page 301

Pages 284 to 301 feature nation-wide

DEALER EXHIBITS

and other advertising of

Current Offerings in

USED MACHINE TOOLS

AND SHOP EQUIPMENT

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*Maintaining our world-wide reputation for . . .

"USED MACHINE TOOLS of the BETTER TYPE"

Twenty-five years of experience and recognition as leading rebuilders of the better type of used machine tools assures MOREY customers the highest standards of excellence in the industry. At this time our stocks are unusually complete, including a broad range of the finest used equipment of every type at exceptionally attractive prices. Leading manufacturers in all parts of the World attest rigidly maintained MOREY policies of expert workmanship and immediate shipment. Advise us of your requirement.

BORING MILLS—Ver. & Hor.

BULLARD 24", 36", 42" N.E.
BULLARD 8"—12" mult-au-matics
BICKFORD 8' ver. 2 swivel heads
SELLERS 84" Ver. 2 swivel heads
NEP 51" & 100" Ver.
GIDDINGS & LEWIS No. 0 3" bar Hor.
CLEVELAND No. 1, 2½" bar Hor.
RYERSON No. 12 4-⅞" bar Hor.

RADIAL DRILLS

AMERICAN 5' 6' Triple purpose Pl.
CINCINNATI BICKFORD 3' 4' 6' Plain
FOSDICK 5' Plain
DRESES 5' Plain
NBP 6' Plain

LATHES

AMERICAN 30"x20' grd hd SPD
AMERICAN 30"x13' grd hd SPD
AMERICAN 24"x16' grd hd SPD
PUTNAM 36"x28' grd hd Motor dr
BRIDGEFORD 36"x40' grd hd MD
SPRING 20"x12' 6" grd hd SPD
REED PRENTICE 24"x12'; 18"x 12' SPD
And a hundred other various size lathes

TURRET LATHES

WARNER & SWASEY No. 3A; No. 2A
JONES & LAMSON 3x36; steel head
GISHOLT No. 4 Universal
WARNER & SWASEY No. 4; No. 6 plain hd
NEW BRITAIN No. 23, 24, 33 chucking
POTTER & JOHNSTON No. 6A; No. 7A

AUTOMATIC SCREW MACHINES

GRIDLEY 9/16", ⅞", 1¼" Model "G" 4 spdle.
GRIDLEY ¾", ⅞", 1¼", 1¾", 2¼" Model "F"
CLEVELAND ⅝", ⅞", 1¼" Models A and B
BROWN & SHARPE No. 00, 0, 2, 2-G

MILLING MACHINES

CINCINNATI No. 3, 4, 5 Plain; SPD
BROWN & SHARPE No. 3B; No. 4B Plain
BROWN & SHARPE No. 3 Plain; cone dr.
CINCINNATI 24" Duplex
CINCINNATI 24" Automatic
TAYLOR & FENN Spline
PRATT & WHITNEY 2", 4" Spline
HENDEY No. 3GS Universal
OHIO No. 42 Universal
PRATT & WHITNEY 4½x12, 6x 48 Thread
LEES BRADNER No. 4, 6, 8 Thread

GEAR CUTTING MACHINERY

GLEASON 6", 8", 11", 18" Bevel Gear
GLEASON 15" Spiral Bevel Finishers
GLEASON 15" Spiral Bevel Roughers
FELLOWS No. 6, 61, 615, 65 Gear Shapers
FELLOWS No. 7, 715, 75 Gear Shapers
BARBER-COLMAN No. 3, No. 12 Gear Hobbers
GOULD & EBERHARDT 18" Gear Hobber

GRINDERS

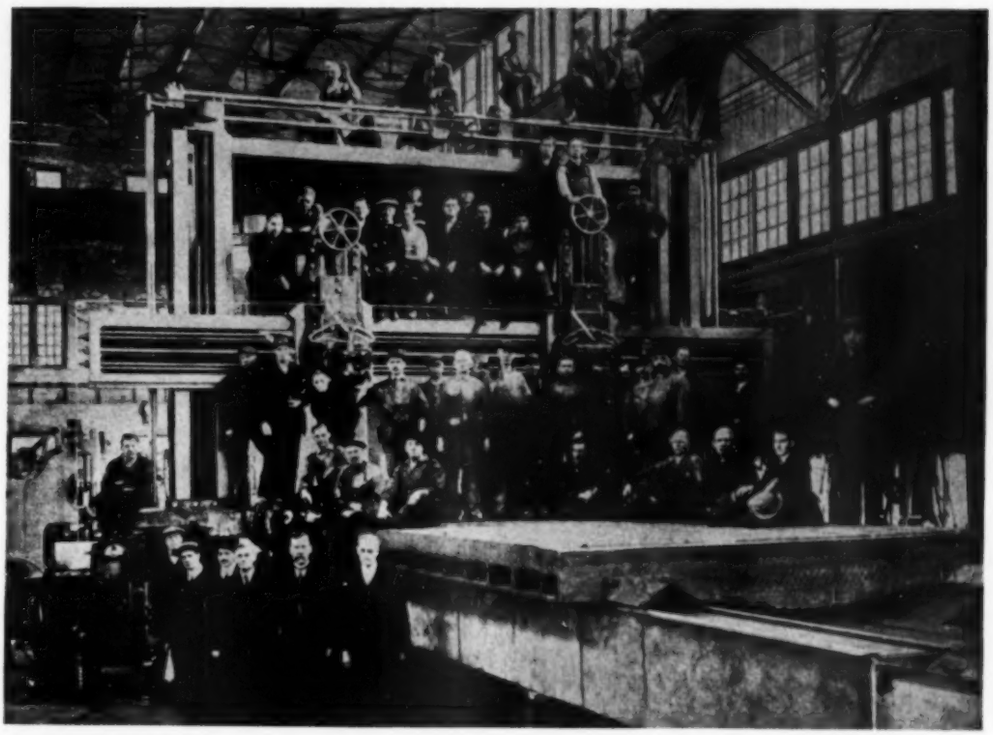
HEALD No. 55, 60, 65, 70 Intl.
BRYANT No. 3 Intl.
LANDIS 6x18, 10x24, 10x52 Plain
LANDIS 16x48 Crankshaft
LANDIS 10x96 Gap
NORTON 6x32, 10x36, 10x72 Plain
NORTON B-81 Crankshaft
NORTON 16x50 Crankshaft
LANDIS No. 1; No. 1½ Universal
BROWN & SHARPE No. 2, No. 3 Universal

MISCELLANEOUS

NATIONAL 4" Upsetting Mach.
ACME 1¼" Model B Upsetter
MORTON 48" Drawcut Shaper
BIGNALL & KEELER 8" Pipe Mach.
LANDIS 2" Pipe Machine
SOUTHWARK 500-ton hydraulic bending and hundreds of other high grade machines

MOREY MACHINERY COMPANY, INC., 410 Broome Street, NEW YORK, N. Y.

"RE-MADE BY SIMMONS"



THIS 12′ x 12′ x 25′ PLANER WAS RE-MADE

IN OUR ALBANY PLANT—ENTIRELY DISMANTLED, WORN PARTS REPLACED, ENTIRELY RESURFACED BED AND TABLE REFINISHED, ASSEMBLED, TESTED UNDER POWER AND FINALLY DISMANTLED FOR SHIPPING. THIS IS A TYPICAL SIMMONS JOB. IT SHOWS THE BUYER THAT WE ARE EQUIPPED TO REMAKE ANY MACHINE TOOL REGARDLESS OF SIZE. WE CARRY A TREMENDOUS STOCK OF TYPICAL LARGE TOOLS—TESTED UNDER POWER. OUR SHOP INCLUDES THE FOLLOWING:

LATHES

96″x56′ N-B-Pond Geared Head
84″x38′ Putnam Geared Head
72″x58′ N-B-Pond Geared Head
72″x45′ Bement Motor Drive
56″x30′ N-B-Pond Geared Head
48″x28′ N-B-Pond Geared Head
36″x12′ American Geared Head
30″x20′ American Geared Head
26″x12′ Bridgeford Geared Head
26″x12′ N-B-Pond Geared Head
25″x10′ N-B-Pond Geared Head
24″x24′ Schumaker-Boye Belt
18″x10′ American Geared Head
10″x 6′ Lodge-Shipley Geared Head

PLANERS

12′x12′x25′ Betts Planer, M.D.
72″ Bement Rotary Planer Mot. Dr.
72″x72″x16′ N-B-Pond
60″x60″x18′ Cincinnati
54″x48″x16′ D-Harvey Openside
48″x48″x18′ Cincinnati
48″x48″x14′ N-B-Pond Motor Drive
48″x48″x16′ Sellers Motor Drive
36″x36″x14′ Gray Motor Drive
36″x36″x10′ N-B-Pond Motor Drive

TURRET LATHES

No. 3-A Warner-Swasey Universal
No. 2-A Warner-Swasey Universal
26″ Libby Turret, 7⅛″ hole
18″ Libby Turret, 3⅛″ hole

MILLERS

No. 5 Cincinnati Plain
No. 4 Kempsmith Maxi
No. 4 Cincinnati Plain
No. 2, No. 3, No. 4 Brown-Sharpe Plain
No. 2, No. 3, No. 4 Cincinnati Vertical
No. 2-A, No. 3-A Brown-Sharpe Univ.
18″, 24″, 28″, 48″ Cincinnati Auto.
18″, 24″, 28″, Cincinnati Auto. Duplex
72″x72″x24′ N-B-Pond Planer Type
66″x62″x16′ Ingersoll Planer Type
24″x24″x12′ Ingersoll Planer Type

BORING MILLS

16′ Betts Vertical Boring Mill
12′ N-B-Pond Vertical
10′ Niles Vertical
72″ N-B-Pond Vertical
61″ Bullard Vertical
60″ Colburn Vertical
48″ Colburn Veritcal
42″ Bullard New Era Motor Drive
42″ King Vertical Motor Drive
36″ Bullard Vertical, Side Head
7″ Bar Newton Horizontal
6″ Bar Barrett Horizontal
4½″ Bar N-B-Pond Floor Type
No. 3 Betts Horizontal, Knee Type
No. 31 Lucas Horizontal Precision

RADIAL DRILLS

6′ Cincinnati-Bickford Plain
6′ Foadick Plain
6′ American Triple Purpose
5′ Cincinnati-Bickford Plain
4′ American Triple Purpose
4′ Cincinnati-Bickford Plain

DRILLS

No. 4-D, No. 6-D Colburn Heavy Duty
24″, 28″, 36″ Cin-Bickford Sliding Head
36″ Snyder Sliding Head
6-spindle Allen High Speed Sensitive
4-spindle Leland-Gifford H. S. Sensitive
3-spindle Leland-Gifford H. S. Sensitive
No. 13, No. 14, No. 16 Natco Multiple Spindle

GRINDERS

30″x96″ Landis Roll Grinder
18″x96″ Norton Plain
14″x72″ Norton Plain
No. 16 Blanchard Surface
No. 1, No. 2 Norton Universal Cutter
No. 13 Brown-Sharpe Universal
No. 1, No. 2, No. 3 Brown-Sharpe Universal
No. 51 Besley Disc, Motor Drive
No. 4 Gardner Disc, Belt Drive
No. 72-A Heald Internal
No. 25-A Heald Rotary
16″ Arter Rotary

GEAR CUTTERS, ETC.

60″ Newark Gear Hobber
96″ Gould-Eberhardt Gear Hobber
96″ Gleason Gear Planer
48″ Gleason Gear Planer
6″, 11″, 18″ Gleason Gear Generator
No. 3, No. 12 Barber-Coleman Hobbers

PUNCH-SHEAR

No. 4, No. 5, No. 6 Hilles-Jones
No. 3 Hilles-Jones Beam Punch
5″x5″ Carlin Alligator Shear

SHAPERS AND SLOTTERS

48″ Morton Draw Cut Shaper
28″ Queen City S. P. Drive
24″ Gould-Eberhardt Motor Drive
24″ Potter-Johnson Universal
22″ Bement Slotter
18″ Dill Slotter
15″ Newton Slotter
10′ N-B-Pond Slotter
Garvin Die Slotter

$25.00 REWARD

Anyone supplying us with information that will lead to the purchase of any of the following items of machinery.

The reward will be immediately paid as soon as purchase is made. Simmons Machine Tool Co., Albany, N. Y.

72 A-2 Heald Size-Matic
36″ New Era Bullards
84 to 120″ Gear Hobbers
25 A Heald Rotary Grinder
25 Heald Rotary Gdr.
20 Heald Rotary Gdr.
8′ to 12′ Planers

SIMMONS MACHINE TOOL CORP.

Broadway, Albany, N. Y.—Cable Address (SIMMONS ALBANY)—149 Broadway, New York City

MODERNIZE WITH REBUILT TOOLS

SECTION OF OUR REBUILDING FLOOR

Save 50% or More on Machine Tools Backed by our Guarantee of Satisfaction. Every machine thoroly rebuilt by factory trained men, made to perform like new and to look like new. For thirty years, we have handled rebuilt machine tools exclusively. It will pay you to inspect our stock of modern tools, rebuilt by our skilled mechanics with many years experience, in our modern plant, one of the best in the rebuilt machine tool trade. A stock of 1,500 machines, covering a floor space of 56,000 square feet.

GRINDERS

No. 72A3 Heald Sizematic, two motor drive, latest
No. 70 Heald Internal, clutch head
No. 25, 25A Heald Rotary Surface, mag. chuck, hydraulic feed
No. 50, 55, 60, 65 Heald Cylinder
No. 11 Giddings & Lewis Teromatic, 3 motor drive
No. 3 Rivet Internal, belt
No. 2 Brown & Sharpe Auto. Surface, mag. chuck
No. 1, 2 Brown & Sharpe Universal
No. 2, 3 Wilmarth & Morman Auto. Surface
No. 78 Wilmarth & Morman, m.d. in base
22" Pratt & Whitney Vertical Surface, B.B.
14" Pratt & Whitney Vertical Surface
18"x48" Diamond Light Duty Face
60" Springfield Automatic Face
6x18", 10x24", 10x36", 10x52", 12x36", 12x72", 16x52", 16x72", 16x32" Landis Plain Cylindrical Self-Contained Grinders, m.d.
6x32", 10x36", 10x50", 14x72", 16x36", Norton Plain Cylindrical
12x36" Cincinnati No. 2 Plain Cylind.
12x36" Cincinnati No. 2 Univ. Cylind.
No. 4 Landis Universal
No. 51 Besly Disc, m.d.

MILLING MACHINES

No. 2, 3, 4 Cincinnati Universal, s.p.d., flanged spindle
No. 2, 3 Cincinnati Universal, cone
No. 3, 4 Cincinnati Vertical, s.p.d., flanged spindle
No. 2, 3S, 3, 4, 5 Cincinnati Plain, s.p.d., flanged spindle
No. 1½, 2, 3, 4 Cincinnati Plain, cone
24", 48" Cincinnati Automatic Duplex, m.d.
24" Cincinnati Automatic Duplex, widened pattern, m.d.
24", 48" Cincinnati Plain Automatics
18" Cincinnati Mfg., m.d.
No. 3B, 4B Heavy, 5B Heavy Brown & Sharpe Plain, m.d., p.r.t., late
No. 1½, 2, 3 Brown & Sharpe Plain, cone
No. 21 Brown & Sharpe Automatic, s.p.d., late
No. 13B Brown & Sharpe Plain, standardized spindle
No. 2B, 3B Milwaukee Plain, double overarm
No. 2½B Milwaukee Vertical, s.p.d.
No. 4 Kempsmith Vertical Maxi-Miller, m.d.
No. 1, 3 Kempsmith Plain, cone
No. 3 Kempsmith Universal, cone
No. 33 Kempsmith Mfg., s.p.d.
4" Pratt & Whitney Spline
6x14" Pratt & Whitney Thread

GEARED HEAD ENGINE LATHES

90"x54' Pond, m.d., 2 carriages
30"x12' American, 12 speed, auto. oiled, late
32" raised 40"x28' Bridgeford, taper attach.
24"x8' American Med. Pattern, 12 speed, auto. oiled
22"x14' Lodge & Shipley Selec. Hd., 12 speed
20"x14' Hendey, taper
20"x8' American, 12 speed, auto. oiled
20"x8' American, 8 speed
18"x8' American, 12 speed, auto. oiled
18"x8' American, 8 speed
18"x8' Lodge & Shipley, taper
18"x6' American, 12 speed, auto. oiled
16"x6' American, 8 speed
14"x8' Reed-Prentice

CONE HEAD ENGINE LATHES

36"x18' American, Hvy. Pattern, 3 step, taper
36"x11' American, 4 step
30"x14' Lodge & Shipley, 5 step
30"x12' Lodge & Shipley, 5 step
28-56"x12' Putnam Gap Sliding Bed, 3 step
27"x12' American H.P., 3 step, bowl hd.
25"x12' LeBlond, 3 step
24"x10' Greaves-Klusman, 3 step
21"x10' LeBlond, 3 step, taper
20"x14' Hendey Yoke Head, taper
20"x10' Boye & Emmes, 3 step
20"x8' American, 3 step, bowl head
18"x10' Hendey, 4 step
18"x10' Bradford, 3 step, taper
18"x8' Lodge & Shipley, 3 step
18"x8' Hendey, 4 step, yoke head
18"x8' American, 3 step, bowl head
16"x6' Hendey, 4 step, taper
14"x6' Lodge & Shipley, 3 step

GEAR MACHINERY

No. 34 Brown & Sharpe Gear Hobbers
No. 7, 75, 715 Fellows H.S. Gear Shap.
No. 12 Barber-Colman, double overarm
No. 3, 12 Barber-Colman
No. 3, 4, 5, 13 Brown & Sharpe Gear Cutters
No. 6, 61, 612 Fellows
No. 5A Lees-Bradner
No. 18H, 18HW Gould & Eberhardt 6", 11", 18" Gleason

PLANERS

60"x48"x28' Cincinnati, 4 heads, m.d.
60"x60"x20' Niles, 4 heads, reversing motor drive
48"x48"x20' Cincinnati, 4 heads, m.d.
48"x48"x20' Niles, 4 heads, reversing motor drive
42"x42"x14' Niles, 4 heads, reversing motor drive
42"x42"x10' Gray, 1 head
33"x33"x8' Ohio, 2 heads, belt
30"x30"x10' American, 1 head, belt
28"x28"x8' Gray, 1 head, belt
24"x24"x6' Gray, 1 head, m.d.
24" Cincinnati Crank Planer, belt

SHAPERS

24" American, gear box, m.d.
25" Springfield, gear box, m.d.
28" Ohio, cone
24", 28" Gould & Eberhardt, cone
24" Gould & Eberhardt, gear box
24" Stockbridge, m.d.
20", 26" Kelly, cone
20", 25" Smith & Mills, cone
20" Cincinnati, cone
16" Springfield, gear box, m.d.
16" Hollingworth, cone

DRILLS

2½', 3', 4', 6' American Triple Purpose, gear box on base
4', 6' American Triple Purpose, m.d. thru gear box on arm
4' Dreses, gear box
4' Fosdick, gear box
3½', 5' Cincinnati Bickford, gear box
4' Hammond Sensitive
7' Fosdick, cone
20", 21", 22", 24", 28", 36" Cincinnati Bickford Upright
20", 22", 22½, 26", 34" W. F. & John Barnes Upright
22", 26" Barnes All Geared Self-Oiling
4 spindle 22" Barnes All Geared Self-Oiling
1, 2, 3, 4 spindle Leland & Gifford H.S. Ball Bearing, No. 2 taper
2 spindle No. 2 Leland & Gifford, direct motor drive on spindles
1, 2, 3, 4, 6 spindle No. 2 Avey H.S. B.B., latest
1, 4, 6 spindle No. 3 Avey H.S., B.B., latest
6 spindle No. 2 Avey, power feed
4 spindle No. 2 Avey-Matic
1, 6 spindle No. ½ Avey, latest
4 spindle Demco B.B.
1, 2, 4, 6 spindle Allen B.B
No. 30 Natco Multiple
No. 25 Bausch Multiple
No. 216, 220 Baker 2 spindle H.D.
No. 121, 217, 310, 314, 315 Baker H.D.
D2, D3, D4 Colburn H.D.
No. 2, 4, 22 Colburn Mfg., latest
4 spindle No. 2 Colburn Mfg.

TURRET LATHES, MFG. LATHES, AND SCREW MACHINES

No. 2A, 3A Warner & Swasey Universal, chucking, m.d.
No. 2A, 3A Warner & Swasey Universal, bar, m.d.
No. 4 Warner & Swasey Universal, cone
No. 1, 2, 4, 6, 8 Warner & Swasey Turret, cone
Dreses Turret, 1¾" cap.
1½x24" Pratt & Whitney Turret
2¼x24" Jones & Lamson, bar
3x36" Jones & Lamson, 2 spindle, chuck.
18", 26" Libby, chucking
No. 2, 4 Milholland Turret
No. 23, 24 New Britain, chucking
No. 5A, 6A, 7A Potter & Johnston Automatics, chucking
21", 24" Gisholt Turret
Gisholt Simplimatic, m.d.
9x14", 9x20" Porter-Cable Mfg.
9x12", 9x24" Sundstrand Mfg.

Miscellaneous

14x14" Bury Class L Air Comp., m.d.
18x12x12" Worthington Steam Driven Air Compressor
½", 1½" Landis 2 spindle Bolt Thread, American Bolt Heading Machine
No. 5 Williams & White Bulldozer
24", 36", 42" Bullard New Era Vertical Turret Lathes
40", 52" King Boring Mills, 2 heads on rail
102" Niles Vertical Boring Mill, m.d., p.r.t., steel gearing, late
15, 30-ton Lucas Power Forcing Presses
No. 0 Giddings & Lewis Horizontal Boring Mill, gear box
No. 0 Fosdick Horizontal Boring Mill, gear box
No. 2, 3 J. N. LaPointe Single Broaches, m.d.
No. 2, 3 J. N. LaPointe Double Broaches, m.d.
No. 2 Baker Keyseater, belt
No. 5 Mitts & Merrill Keyseater, belt
No. 26 Stoll Geared Horning Press, m.d.
No. 92½C Toledo D.C. Geared Press, m.d.
P2, P3, P4 Ferracute Presses, m.d.
851 Ferracute Press, m.d.
10' Bertsch Power Squaring Shear, 3/16" cap.
15" Niles-Bement-Pond Slotter, belt
No. 2, 2X, 2BX Garvin Auto. Tappers

THE EASTERN MACHINERY CO.

Write for Complete Stock List

3260 Spring Grove Ave.

Telephone Kirby 4705
Cable Address Eimco, Cincinnati, O.
Codes used: Bentleys, ABC 6th Ed., General Telegraph Improved

Cincinnati, Ohio

A CONTINUOUS EXHIBIT OF LATE TYPE USED MACHINE TOOLS

IMMEDIATE DELIVERY

"One Bay in Our Elston Avenue Warehouse"

A REPRESENTATIVE SELECTION FROM OUR STOCK:

10′x¼″ Dreis & Krump Press Brake
6″ Goss & De Leeuw Chucking Machine
Baird 6-Spdl. Chucking Machine
8″ Cleveland Mod. M 4-Spdl. Chucking Machine
No. 6 Reed Prentice Die Sinker
Natco Multiple Drills
10″ Gleason Spiral Generators
No. 7 Fellows Gear Shapers
14″ Model B. P. & W. Vertical Surface Grinder (late type; m.d.)
No. 25-A Heald Rotary Surface Grinders
No. 2 Cincinnati Centerless Grinders
No. 3 Cincinnati Centerless Grinder
No. 3 Bryant Semi-Automatic Grinders
No. 12-A Bryant 2-Spdl. Semi-Automatic Grinders
No. 1-A Pratt & Whitney Jig Borer
8″ Sundstrand Stub Lathes
12″ Sundstrand Stub Lathes
6¼x15″ Model R LoSwing Lathes
14″x33″ Fay Automatic Lathes
27″x12′ LeBlond Engine Lathe (Timken bearing)
Cincinnati Vertical Mills from No. 1-M to 4
No. 3 Van Norman Duplex Mills
Brown & Sharpe Double Overarm Universal Milling Machines
48″ Cincinnati Automatic Duplex Mills
No. 4-48″ Cincinnati Hydro-Matic Mill
No. 4-36″ Cincinnati Hydro-Matic Mill
Sundstrand Rigidmills—Simplex and Duplex
No. 94-H Toledo D.C. Press
No. 80½ Bliss S.S. Press
Bliss 400-ton Coining Press
1¼″ Cone 4-Spdl. Screw Machine
2″ Greenlee 4-Spdl. Screw Machine
3½″ Cone 4-Spdl. Screw Machine
36″ American Heavy Duty Shaper
A. E. F. Projection Welders

EMERMAN RED BOOK
Machinery Tools and Supplies
No. 35
LOUIS E. EMERMAN COMPANY
1761 ELSTON AVE. CHICAGO
HEADQUARTERS FOR ALL TYPES OF METAL WORKING MACHINERY— STAMPING PRESSES—STRUCTURAL TOOLS
LOUIS E. EMERMAN AND COMPANY
1761 ELSTON AVE. CHICAGO TEL. BRUNSWICK 4130
— Also FORGING EQUIPMENT — HYDRAULIC EQUIPMENT
— Our Stock is Large and Varied
— Our Prices Represent Real Values
SEND US YOUR INQUIRIES

GOING TO THE CLEVELAND SHOW?

On your way to the Machine Tool Show—or on the way home, stop off and look over the following machines, all as modern as the latest and used so little that they can hardly be told from new AT REAL MONEY SAVING PRICES.

POWER PRESSES

INCLINABLE PRESSES
Bliss-Consolidated No. 2.
Cleveland Nos. 5-1, 5½-1, 6-1, 8-1.
Federal Nos. 2, 3, 4.
Ferracute Nos. 13-C, 15-C, 16-C.
Loshbaugh-Jordan No. 3.
Minster No. 3.
Niagara No. 5.
R&K (American Can) Nos. 2, 3.
Toledo No. 3.
V&O Nos. 00, 2, 2½, 3½.
Walsh No. 4.

HIGH SPEED DIEING PRESSES
Henry & Wright 50, 75, 100 ton.

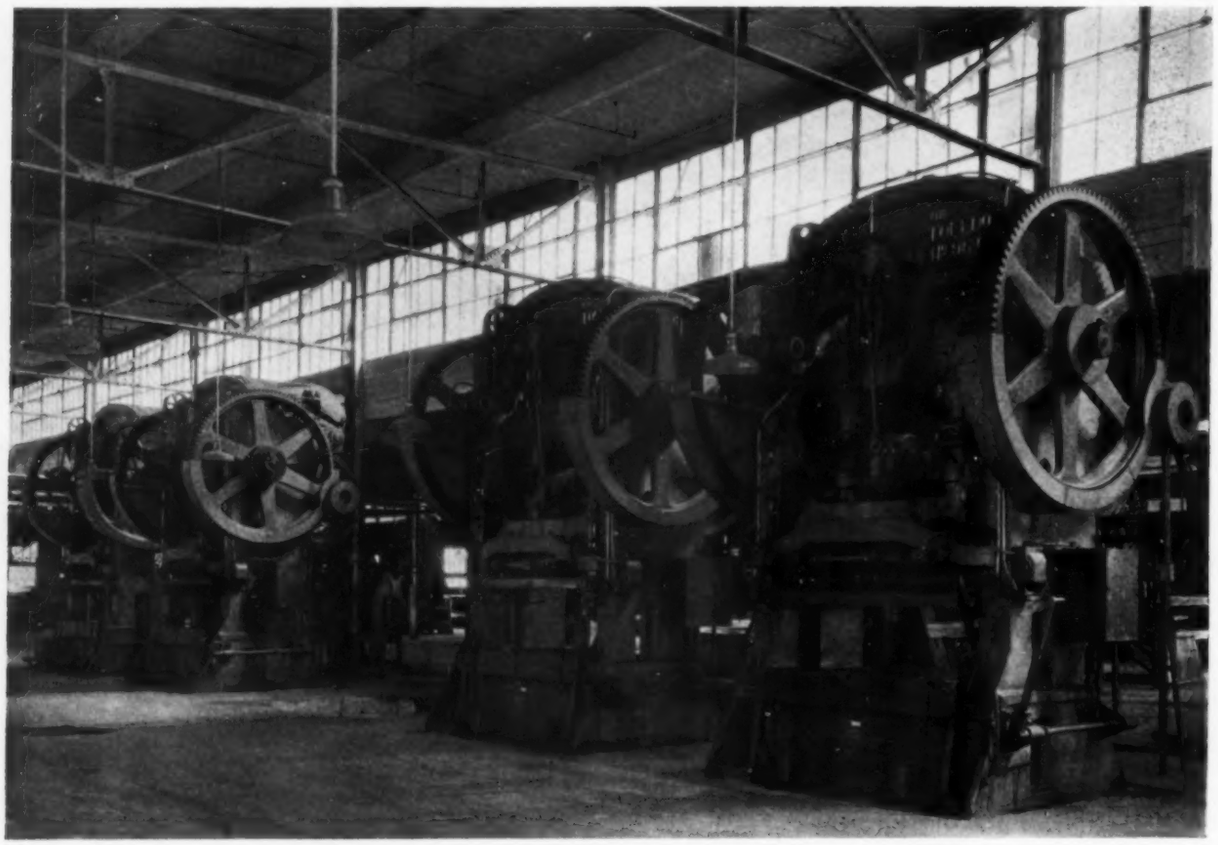
HORNING PRESSES
Ferracute CA-15.
Minster No. 10-2.
Toledo No. 14, Geared.

PUNCHING PRESSES
Ferracute Nos. P-2, P-3.
Toledo No. 32.

STRAIGHT SIDE PRESSES
Ferracute No. DG-57½-A.

OVERHANGING DOUBLE CRANK PRESSES
Ferracute No. ST-25.
Minster No. 60-2½-24.
Minster No. 60-3-32.
Toledo Nos. 200-C, 201-E, 203-C.

STRAIGHT SIDE DOUBLE CRANK PRESSES
E. W. Bliss Co., Nos. 4-A, 4-B.
Minster No. 50-5½-96".
Minster No. 50-7½-60".
Toledo Nos. 90-F, 90-H, 93-I, 94-F, 96-C.



PRODUCTION EQUIPMENT

CHUCKING MACHINES
Baird Six Spindle—7⅛".
Cleveland 4"—4½"—8".
National Acme 4".

DRILL PRESSES
Allen single and four spindle.
Avey single and two spindle.
W. F. & John Barnes No. 920.
Barnes 30".
Barnes 42" (arranged for lapping).
Bradford, Buffalo, Burke, Canedy-Otto.
Cincinnati single and three spindle.
Edlund Nos. 1-B, 2-B, 3-B, single, two, three and four spindles.
Fosdick single, two and three spindles.
KINGSBURY: We can meet any specifications on these.
Leland-Gifford single, two and three spindle.
Taylor & Fenn single, two, three and four spindle.

GRINDERS
Arter No. 132, Automatic cylindrical.
Arter rotary surface.
Besly No. 8 Disc.
Brown & Sharpe No. 1 Universal, No. 11 Plain.
Bryant No. 12-A chucking.
Cincinnati 8x18 Cylindrical.
Diamond No. 6 Disc.
Diamond Surface.
Fitchburg Universal Cylindrical.
Wilmarth & Marmon Surface.
PRATT & WHITNEY 8" Surface Grinder, Rotary.
PRATT & WHITNEY 14" Vertical Surface, Model B.
Sellers tool.

BROACHING MACHINES
American 2 and 12 ton Vertical.
Foote-Burt No. 1 Surface.

LAPPING MACHINES
Ashton-Russell Center Lappers.
Norton No. 1-F.
Barnes 42" Flat Plate Lapper.

LATHES
LeBlond Multi-Cut.

MILLING MACHINES
Brown & Sharpe No. 2-A Universal, Dividing Head, Vertical Head, etc.
Pratt & Whitney 6" x 14" Thread Millers.
Standard No. 1 Hand Millers with vertical spline milling head.

PLANER
Cleveland Openside.

PLATING EQUIPMENT
Semi-Automatic Tin, Hot Tin Dip, complete.

PROFILERS
Pratt & Whitney No. 12.

SCREW MACHINES
No. 2-G Brown & Sharpe.
Cleveland ⅝" Model B, ⅞" Model B.

SHAPERS
Cincinnati, 32".
Gould & Eberhardt 20".
Potter & Johnston 15".

SPOT WELDERS
A.E.F. No. MD-12.

SLITTERS
Yoder 36".

TAPPERS
Anderson No. 40.
Boley Multiple Drilling and Tapping.
Globe No. D-17.
Natco.

◀ **Optimeters, scleroscopes, lite gauges, dial indicators, Shore monotrones, surface and lapping plates, plug and snap gauges, etc.** ▶
Detailed lists on application or send us your needs.

FRANK M. McKEY, Trustee GRIGSBY-GRUNOW CO.
TELEPHONE, BERKSHIRE 7500 ***5801 DICKENS AVE., CHICAGO, ILL.***

Notice

THE RECEIVERS of the Willys-Overland Company have ordered us to sell at once all of the machinery heretofor reserved for the prospective manufacture of a six cylinder (Model 99) automobile.

This comprises the entire Model 99 lines of machinery at

WILLYS-OVERLAND COMPANY
TOLEDO, OHIO

AND

WILSON FOUNDRY & MACHINE COMPANY
PONTIAC, MICH.

APPROXIMATELY 4000 MACHINES FOR IMMEDIATE SALE!

PRESSES
Forming, Toggle, Oil Gear, Forcing & Bench.

FORGING
Upsetters, Bulldozers, Steam Hammers, Board Drop, Bradley Trip Hammers, Furnaces and Trimming Presses.

GEAR MACHINERY
Hobbers, Gear Shapers, Worm and Gear Generators.

MILLING MACHINES
Hand, Plain, Vertical, Manufacturing, Rotary, Continuous and Tilted Rotary, Single and Duplex Automatics, Drum, Planer Type and Die Sinkers.

DRILLS AND TAPPERS
Sensitive, Stationary and Sliding Head, Heavy Duty, Sensitive Radial, Vertical, 2-Way, 3-Way, Camelback, Gang and Multiple Spindle.

GRINDERS
Pedestal, Tool and Cutter, Drill, Milling Cutter, Centerless, Cylindrical, Crankshaft, Plunge Cut, Internal Brake Drum, Diamond Face, Osterholm Surface and Polishing Jacks.

LATHES
Engine, Turret, Crankshaft, Camshaft, Axle, Automatic, Production and Low Swing.

WELDING
Arc, Seam, Butt, Spot and Gun.

BORING, DRILLING, REAMING MACHINES—Vertical
24" to 34" Bullard, King, Gisholt, Rogers; No. 920 Barnes Oil Gear; 4 and 6 Spindle Foote Burt Cylinder Block Mills; and 12 spindle Barnes & Foote Burt Tappet Reaming Machines Oil Gear.

HORIZONTAL
No. 420, No. 430 Barnes, Foote Burt Block Line Reaming Mills Oil Gear.

WOODWORKING
Molders, Mortisers, Planers, Shapers, Boring, Nailing, Glue Jointers, Variety, Rip, Cut-Off, Edging Saws, Tenoners, Carvers and Stickers.

ELECTRIC
25 HP. Dynamometers; 5000 Amp. 6 volt Plating Sets; 500 KVA Motor Generator Set; Electric Factory Trucks.

GENERAL MANUFACTURING
6", 8", 12", 16", Mult-Au-Matics; 10", 12" Continu-Matics; Davis Thompson Roto-Matics; Broaching Machines; Engraving Machines; Tire Mold Profilers; Lucas Straightening Presses; Crankshaft and Flywheel Balancers; Die Spotting Presses; Sand Blast; Testing Machines; Tube Machines; Pickling Machines; Glass Machinery, etc., etc., etc.

This affords an unusual opportunity to purchase for immediate delivery . . . at bargain prices . . . a complete assortment of standard high grade modern machinery.

Due to the great quantity and diversity of the machinery to be sold it will be impossible to prepare for distribution "complete lists," with prices. Come to Toledo prepared to do business. . . . First come, first served!

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Industrial Plants Corporation
(OHIO)

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Administration Bldg. . ▪ 'Phone Jefferson 2121

COLUMBUS **TOLEDO, OHIO** **NEW YORK**

High Grade Machine Tools

Automatics, Turret Lathes and Screw Machines

No. 2A Warner & Swasey Univ. Turret Lathe S.P.D.
No. 3A Warner & Swasey Univ. Turret Lathe S.P.D.
No. 4 Warner & Swasey Plain Turret Lathe Cone.
9x14 Fay Automatic.
No. 2 Warner & Swasey.
No. 0G Brown & Sharpe Automatic.

Boring Mills

No. 1 Barrett Horizontal Mill.
24" Bullard Rapid Production Boring Mill.
60" Niles Bement Pond Constant Speed A.C., M.D.
No. 35 Landis Horiz.
72" Betts Vertical Mill.
No. 0 Giddings & Lewis Horiz. Mill.

Gear Cutters

6" Gleason Bevel Gear Generator, S.P.D.
18H Gould & Eberhardt Hobber, S.P.D.
36-BM Gould & Eberhardt Gear Roughers.
No. 1 Adams Farwell Gear Hobber.
No. 12 Barber Colman Gear Hobbers, S.P.D.
Nos. 6, 61, 65 & 615 Fellows Gear Shapers.

Grinders

No. 2 Brown & Sharpe Surface, Belt drive.
No. 2 Oakley Tool & Cutter Grinder.
No. 3 Ohio Tool & Cutter Grinder.
6x18, 10x36, 12x52" Landis Grinders.
Style P Yankee Drill Grinder.
No. 5 Oliver Drill Grinder, motor in base.
16"x48" Landis Crank Grinder.
No. 55 Heald Internal Grinder, Complete.
No. 60 Heald Internal Grinder.
No. 65 Heald Internal Grinder.
Nos. 1 & 2 Diamond Surface Grinder, Belt drive.
12"x52" Landis, Self Contained.

Lathes

30"x12' Lodge & Shipley Sel. Grd. Hd. S.P.D.
28"x48"x12' Harrington Sliding Bed Gap.
20"x10' American Geared Head.
36"x16' Lodge & Shipley Sel. Grd. Head, S.P.D.
20x30x7' Monarch Gap Grd. Head, S.P.D.
48" Niles Car Wheel Lathe.
30"x18" American, Cone Head, Bowl Head High Duty, Q.C.
21"x8' LeBlond Heavy Duty, 3 S.C.D. D.B.G.
18"x10' Lodge & Shipley Selective Grd. Hd.
42"x34' American Grd. Hd. S.P.D.
42"x30' Putnam Grd. Hd. S.P.D.
36"x18' American Grd. Hd., S.P.D.
24"x10' Bradford Grd. Hd. Arr. M.D.
24"x16' American Grd. Hd. S.P.D.

Presses, Sheet Metal Machinery

Style E Rock River Punch & Shear, 30" throat.
Lysholm Double End Punch & Shear, 36" throats, Armor Plate.
No. 5 Canton Alligator Shear.
5"x3/16" Niagara Shear, 18" gap.
No. 43 Robinson Double Crank Press.
No. 50 Toledo Arch Press, 10" stroke.
10' Ohl Squaring Shear, 19 Gauge Capt.
96-A Toledo Dble. Crank S.S. Press.
No. 862 Niagara Squaring Shear.

Radial & Upright Drills

5' American, S.P.D.
6' American Trip. Pur. S.P.D.
3, 3½ and 6' Cincinnati Bickford S.P.D.
3' and 4' Dreses, S.P.D.
24" Cincinnati Bickford Upright Tapping, Back Geared.
5' Cincinnati Bickford S.P.D.
No. 14 Natco Multiple Drill, 30 Spindle.
No. 314 Baker Drill.
6' Harrisburgh Radial, Arr. M.D.

Milling Machines

No. 2 Cleveland Plain, S.P.D.
No. 3B Milwaukee Plain, S.P.D. Double Overarm.
No. 3 Kempsmith Plain, Cone Drive.
No. 3 Kempsmith Universal, Cone Drive.
10" Pratt & Whitney Automatic.
No. 2 Rockford Heavy Duty, Univ., cone drive.
12" Cincinnati Mfg. Belt drive.
18" Cincinnati Mfg. Belt drive.
24" Cincinnati Automatic Belt drive.
18" Cincinnati Automatic Belt drive.
5" Pratt & Whitney Automatic Miller.
No. 7H Becker Lincoln Type Milling Machine.
6x14 Pratt & Whitney Thread Millers.
No. 3 Lees-Bradner Thread Miller.
No. 3H LeBlond Milling Machine Plain, Cone.

Planers

26"x26"x12' Whitcomb Blaisdell, Belt drive.
42x42x10 Cleveland Openside, 3 hds., arr. A.C. M.D.
42x42x8 Liberty Openside, late type M.D.
26x26x8 Cleveland Openside.

Shapers

16, 20 and 24" Gould & Eberhardt Cone drive.
16, 20 and 24" Gould & Eberhardt S.P.D.
16" Stockbridge M.D.
28" Gould & Eberhardt High Duty.

Miscellaneous

12" Betts Slotter.
No. 1 and 2 Davis Keyseating Machines.
No. 0, No. 1 and No. 3 Baker Keyseating Machines.
No. 1 and 3B Lapointe Broaching Machines.
V-18 American Vertical Broaching Machine.
1½" Landis Bolt Threader, Geared Head, M.D.
1" Landis Double and Single Spindle Bolt Threaders.
1¼" Landis Pipe & Nipple Threading Machine.
2" Landis Pipe Threading Machine.
6" Landis Pipe Machine.
4" Oster Pipe Threading Machine.
4" Merrill Pipe Threading Machine.
15, 30 and 50 Ton Lucas Forcing Presses.
No. 1 and 2 X Garvin Tappers.
All Sizes of High Speed Riveting Machines.
No. 18-36" Morgan Nailing Machines.
Compressors. All Sizes.
2" Landis Bolt Threading Machine.
2½" Landis Bolt Cutter, Lead Screw.
2" Landis Pipe Machine.
No. 2 Mitts & Merrill Keyseating Machine.

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**28 West Second Street
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EXCEPTIONAL VALUES IN
FINE USED MACHINE TOOLS

MILLERS

Milwaukee No. 1½B S.P.D. Universal Miller.
Cincinnati No. 2 Rectangular Overarm Single Pulley Drive Universal Miller.
Cincinnati No. 2 S.P.D. Plain Miller.
Kempsmith No. 2 Maximiller, motor in base.
Rockford No. 2 S.P.D. Plain Miller, BRAND NEW.
Brown & Sharpe No. 2A S.P.D. Universal Miller.
Brown & Sharpe No. 2B S.P.D. Plain Miller.
Milwaukee No. 3B S.P.D. Plain Miller.

NOTE: All above with standard equipment, some with extra equipment.

Sixty Additional Universal and Plain Millers in Stock.

LATHES

Monarch 18"x10' Geared Head Motor in Base Q.C.G. Lathe with taper attachment, two chucks.
Hendey 20"x8' Q.C.G. Cone Drive Lathe, Serial No. 20269.
Hendey 24"x9' Q.C.G. Cone Drive Lathe, Serial No. 23788.

NOTE: All above with regular standard equipment and chucks.

Other Lathes in Stock From 12"x5' to 42"x18'.

SHAPERS

Gould & Eberhart 16" Back Geared V-way Shaper, motor drive.
Smith & Mills 16" Back Geared V-way Shaper, cone drive, 90% new.
Gould & Eberhart 20" Back Geared V-way Shaper, motor drive (used less than 3 months).

NOTE: All above with standard equipment.

Other Shapers in Stock From 7" to 24".

GRINDERS

Ohio No. 3 Universal Wet & Dry Tool & Cutter Grinder with attachments, motor drive with two motors.
Norton No. 2 Universal Tool & Cutter Grinder with attachments (used less than two months).
Reid No. 2 Surface Grinder with 16"x6" magnetic chuck.
Heald No. 55 Cylinder Grinder with fixture.

All above with standard equipment.

TURRET LATHES

Warner & Swasey No. 2 Hand Turret Lathe, 1" capacity, arranged for motor drive with motor.
Warner & Swasey No. 4 Universal Turret Lathe, 1½" capacity, with taper attachment, with the finest assortment of equipment possible, 90% new.
Foster No. 3 S.P.D. Turret Lathe, 1¼" capacity.
Acme No. 6 Turret Lathe, 2" capacity, arranged for motor drive with motor.

NOTE: All above have standard equipment and in each case extra equipment such as collets, box tools, etc.

(Numerous Others in Stock)

MISCELLANEOUS

Barnes No. 300, 20" General Purpose Production S.P.D. Drill, capacity 1½", 95% new.
Bradley 200 lb. Upright Helve Hammer.
Pels No. M. E. 10 Brand New Combination Punch & Shear with coping attachment, motor drive with motor.
Schatz No. 16 Combination Punch & Shear.
Bliss No. 225 Gang Slitter, Brand New, with grinding attachment, arranged for motor drive.
Bliss No. 19 and No. 21 Power Presses, 2" strokes, Brand New.
Bliss No. 21½ Geared Late Type Inc. Power Presses, 4" stroke.
V & O No. 104 Geared Reducing Press, 7" stroke with King Pressure Toggle.
Brown & Sharpe No. 00 Automatic Screw Machines.

We are interested at all times in BUYING for CASH fine used MACHINE SHOP, TOOL ROOM and SCREW MACHINE EQUIPMENT.

WILLIAM J. LOHN, Inc.

6 Howard St., New York, N. Y.

You can stretch a limited budget with the same efficiency by using RIVERSIDE used MACHINE TOOLS

BORING MILLS

No. 309 Detrick & Harvey floor type boring mill, 5" bar, rapid power traverse, floor plate and outer support, motor drive.
4½" bar Defiance horizontal boring mill, motor drive.
36" Bullard New Era type vertical.
24" Bullard vertical rapid production type.

MILLING MACHINES

No. 4 LeBlond cone drive plain.
No. 3 Cincinnati cone drive plain.
No. 2 Rockford all geared single pulley drive with vertical attachment.
2—No. 2 Cincinnati cone drive, plain.
28" Cincinnati semi-automatic mfg. type.
3—Type A Gooley & Edlund mfg. type.
No. 2 Knight vertical milling and drilling.
No. 1 Cincinnati universal cone type.
2—No. 3 Cincinnati universal cone type.
No. 2M Potter & Johnston dbl. table auto.
4" Newton double end spline.
No. 3 Cincinnati vertical.

DRILLS

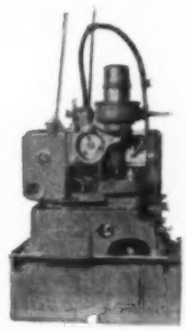
7' American triple purpose inclosed head radial drill, motor drive.
6' American inclosed head triple purpose radial drill, motor on the arm.
2—No. 416 Baker heavy duty, 5" spindle.
No. 314 Baker heavy duty.
No. 2 Colburn heavy duty.
28" Aurora sliding head, B.G.
Foote Burt 34".
2—Barnes horizontal adjustable head.
No. 1—16 spd. Bausch multiple.
30 spindles of No. 2 Avey high speed b.b. drills, 1-2-3-4 spd. type.

LATHES

36"x15' Bridgeford, all geared, motor drive.
30"x10' Springfield cone, D.B.G.
18"x10' Bradford, Q.C.
18"x 8' Hendey, taper attachment.
16"x 6' Hendey, taper attachment.
18"x 8' Monarch, Q.C.
16"x 8' Monarch, Q.C.
16"x 8' American, Q.C.
16"x 6' Hendey, taper attachment.
3—12"x5' Hendey, Q.C.
10 Coulter automatic threading.

GRINDERS

Springfield 45" vertical and horizontal rotary oscillating surface.
No. 4 B&S universal, belt drive.
No. 3 B&S universal, belt drive.
No. 2 B&S universal, belt drive.
14"x36" Queen City, self contained.



1—Practically new No. 712 Fellows Gear Shaper, arranged for motor drive, used less than 60 days.

10"x36" Landis plain, self contained.
1—No. 11 B&S plain, self contained.
2—No. 65 Heald internal.
2—No. 70 Heald internal.
No. 2 Sellers universal tool.
2—No. 3 Wilmarth & Morman surface.
No. 78 Wilmarth & Morman surface.
No. 6 Gardner B.B. disc, belt drive.

PRESSES

No. 57½ Consolidated trimming press, D.B.G., 10" stroke, clutch operated.
No. 3 D. C. Bliss 30" square bolster, 6" stroke.
No. 92½C Toledo, D.C., B.G., 3" stroke.
About 20 O.B.I. All sizes.

SHAPERS

2—24" G&E, B.G., cone drive.
20" Springfield, B.G., cone drive.
20" G&E, B.G., cone drive.
2—16" G&E, B.G., cone drive.

PLANERS

48"x18"x12' Cleveland openside, M.D.
36"x36"x12' Bickett, double housing.
30"x30"x10' Liberty, openside.
26"x26"x 8' Cincinnati, double housing.

MISCELLANEOUS

1—10½x14x17x14 Ingersoll Rand type XRE, direct synchronous, motor drive, air compressor, 877 ft., 185 hp., built-in motor.
1—14x12 type EH-1 Ingersoll Rand air compressor.
No. 7 Foster friction head universal hand screw machine, 2 9/16 capacity.
19x12x14 Bury air compressor.
14x12x9x12 Imperial XB2 Ingersoll Rand air compressor.
No. 26 Williams & White bulldozer.
No. 712 Fellows gear shaper.
No. 4B Etna swager.
No. 652 New Britain automatic chucking machine, M.D.
3—⅝" Landis double spindle bolt cutters.
2" Acme double spindle bolt cutter.

Over 800 machines in stock to select from

RIVERSIDE MACHINERY DEPOT, 245 ST. AUBIN AVE. DETROIT, MICH.

YOUR OPPORTUNITY TOOLS FROM STOCK

We now occupy new and much larger quarters where our facilities for re-building and stocking equipment are greatly increased. There are hundreds of opportunities daily to be found in our large stocks and offered to buyers of machine tools and plant equipment. We also have an enormous stock of Cutters, Drills, Reamers, Production Tools and general shop supplies.

The listings in this ad are only partial. If you don't see what you want here, write and tell us of your requirements.

LATHES

2—16x6 Monarch Geared Head, M.D.
24x12 Chard, 4 Step Cone, D.B.G.-Q.C.
16x6 Sidney, Medium Pattern, Geared Head, M.D.
14x6 Bradford, 5 Step Cone, S.B.G.-Q.C.

GRINDERS

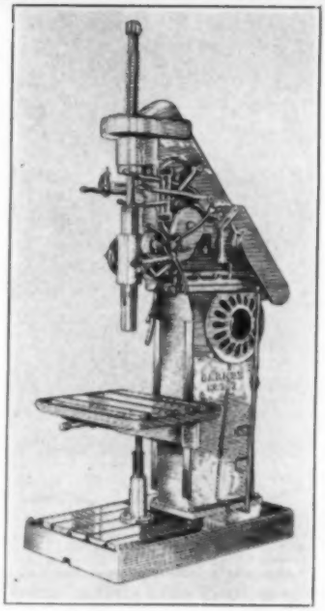
No. 2 Cincinnati Centerless, M.D., Tex Rope Drive, Hyd. T. A., Serial H-2044-F.
14x50 Norton Plain Cylindrical, arranged for M.D.
No. 6 Besley Double Disc, 2-10 H.P. Motors on Spindles, Truing Attachment, 14" horizontal adj.

MILLING MACHINES

2—No. 4 Cincinnati Vertical, Full Powered, Rapid Traverse, S. P. Drive.
No. 3 Cincinnati Vertical, Full Powered, Plain Table, M.D.
No. 4 Cincinnati Horizontal, High Powered, Rapid Traverse, S. P. Drive.
No. 3-B Milwaukee Double Over Arm, 72x15 Plain Table, Belt Drive.

AUTOMATICS

No. 0-G Brown and Sharpe, ¾" Cap. Screw Slotting Att.



2—No. 2-G Brown and Sharpe, 1½" Cap.
3—¾" Model F Gridleys, Regular Equip.
5—1¼" Model F Gridleys, Regular Equipment.
2—1½" Model F Gridleys, Regular Equipment.
⅞" Model G Gridley, Reg. Equip.

DRILLING MACHINES

3' American Radial, Motor on Arm, Full Powered Arm and Head, No. 3-M. T., Serial 54944.
3' American Sensitive Radial, Arranged for Motor on Arm, Hand Elevation, No. 3-M. T., Serial 55361.
No. 242 Barnes Upright, M.D. in Column, 4 Speeds, 4 Feeds, B. G.-P. F. No. 5-M. T.
No. 30 Natco 42 Spindle Multiple, Rectangular Head 16x36.
24" Leland Gifford Heavy Duty, All Geared Direct M.D. No. 4-M. T.
2—No. 2 Four Spindle Leland Gifford Double B. B. No. 2-M. T.
No. 1 Three Spindle Leland Gifford Double B. B. No. 2-M. T.
5—24" Cincinnati Upright Drills, B. G.-P. F., Tapping Attachment, B. D. No. 4-M. T.

MISCELLANEOUS

20 Ton V-25 American Vertical Broach, M.D.
Gisholt Vertical Balancing Mach., M.D.
3⅛" Garvin Die Slotter.
150-kva. Gibb Spot Welder, Air Operated Foot Control, 15" Throat.

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3460 East Jefferson Ave., Detroit Michigan
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America's Largest Dealers in Rebuilt Machinery Offers You

BORING MILLS

3—Bullard 42" New Era, 9000 Serial
Lucas No. 21 Horizontal
Universal 3" Bar S.P.D. Horizontal

DRILLS

American 6' Radial Triple Purpose
Cincinnati 4' Radial, S.P.D.
Bickford 4' Radial
H. & W. 3' Sensitive
Morris 4½' Radial
Carlton 4' Radial
Allen 6 Spindle Ball Bearing
9—Henry & Wright Class B & K, Sgle. Spindle
Weigel (Foster) 25" Style PT Upright with tapping attachment
Pratt & Whitney No. 12, No. 13 Mult. Spindle

GEAR CUTTERS

Barber-Coleman No. 2, No. 12 Gear Hobbers
Whiton No. 14

GRINDERS

Brown & Sharpe No. 2 Surface, 7000 Serial
Blanchard No. 16, 26" chuck
Pratt & Whitney 14", B.B., Vert. Surface
Wilmarth and Morman No. 78, B.B. Auto. Surface Grinder
Brown & Sharpe No. 26, 16"x72" Plain Cylind.
Brown & Sharpe No. 1, No. 2 Universal Grinders
Brown & Sharpe No. 10, No. 11 Plain Self Contained
Brown & Sharpe No. 13 Universal & Tool Grinder
Abrasive No. 3
Norton 6"x32", 10"x36", 14"x36"
Cincinnati No. 1½ Tool & Cutter
Oliver No. 31 Drill Pointer, M.D.
Gardner No. 120 Disc

HEADERS

W.F. No. 6, S.S.S.D. Ball Header, like new
W.F. No. 5, D.S.O.D. Header

LATHES

Hendey 12"x5', 14"x6', 16"x6', 20"x10' Yoke Head
Hendey 32"x12' Cone Head
Willard 12"x5'
LeBlond 14"x6'
Lodge & Shipley 14"x6', 16"x8' Geared Head
Cisco 20"x8', H.D.
American 16"x6'
American 36"x18', Geared Head, M.D.
McCabe 27" and 29"x24', "2 in 1" Lathe
Bardons & Oliver 5", Turret, arr. for M.D.
Jones & Lamson 2¼"x24", 3"x36", Turret
Cin-Acme Universal 3¼"x36" with chucking equipment
Warner & Swasey No. 2A, 3A Universal Turret

MILLERS

Kempsmith No. 2, No. 3 Plain
Brown & Sharpe No. OY, O, 1Y, 1, 1½, 2, 2Y, 2B, 3, 4, Plain
Cincinnati No. 3, No. 4 Plain
Brown & Sharpe No. 1, 1½, 2, 3A, S.P.D. Univ.
Rockford No. 2B Universal, S.P.D.
Kempsmith No. 3 Univ. Slotting Attachment
Cincinnati No. 2 Vertical Miller
Cincinnati No. 3 Vertical Miller, High Power, S.P.D.
Becker No. 4B Vertical Miller
Whitney & Standard Hand Millers
Pratt & Whitney No. 2 Column Power Miller
Pratt & Whitney 4½"x12", 12"x48" Thread Millers

MISCELLANEOUS

Keller E-5 Engraving Machine, M.D.
Pratt & Whitney Gun Machinery
Campbell No. 2 Nibbler
Noble & Westbrook No. 15 Marking Machine
Garvin No. 2, No. 2X, No. 2BG Tappers
Foot-Burt No. 1, M.D. Vertical Surface Brosch.
Pratt & Whitney & Reed-Prentice No. 12 Profilers
Reeves No. 3 Class A, Var. Speed Transmission
Cochrane-Bly No. 2 Floor Type Filing Machine
Pratt & Whitney 48" Measuring Machine

PLANERS

New Haven 24"x24"x4' Single Head
Whitcomb 24"x24"x6'
Cincinnati 24"x24"x8' Single Head
Whitcomb-Blaisdell 26"x26"x17', 2-Head
Whitcomb 30"x30"x8' Single Head
Whitcomb 30"x30"x12', 2-Head
Woodward & Powell 36"x36"x10' Motor Driven, 3-Head
Chandler 36"x36"x12', 2-Head
Cincinnati 42"x42"x18' Variable Speed, M.D., 3-Head
Whitcomb 54"x36"x11' 6" 2-Head

PRESSES

2—Henry & Wright 50-ton Dieing Machines, Roll Feeds
Bliss 60-ton Geared Shell Tapering Press
2—Bliss No. 60½ Geared Rack & Pinion Presses
Ferracute No. SGG522 Twin Geared Double Crank Straight Sided Stamping Press
Cleveland No. 154C Geared Double Crank Straight Side Press
Terkelsen Hydraulic Press for molds
Federal No. 3, O.B. Inclinable Press.
3—Consolidated No. 04, 4½" stroke, Open Back Presses
Lucas 15-ton Power Forcing Press
Lucas 30-ton Power Forcing Press
Consolidated No. 72, O.B.
Consolidated No. 74 Geared O.B.
V. & O. No. 104 7" Stroke Reducing Press
Perkins No. 3H, Double Conn. S.S. Press
Standard No. 5B, O. B. I. Power Press

SHAPERS

Rhodes No. 3 Vertical
Hendey 15" Friction
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Potter & Johnson 15" Universal Crank
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No. 30 Natco Multiple Drill.
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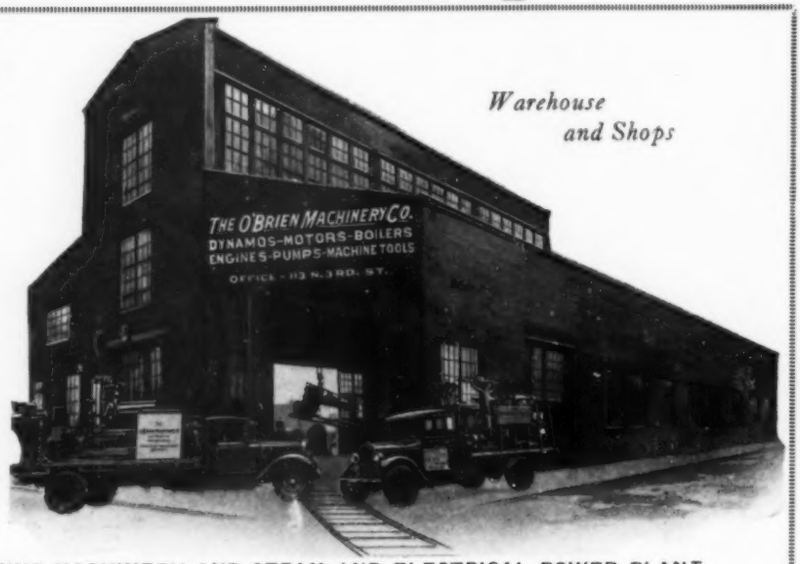

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Model A ½"—⅞"—1 1/16"—1 ½"—2"—2 ⅝"—3 ⅝" —4 ½"—5 ⅛"—6 ⅜"—7 ⅝".
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Grinder—Norton, 10"x120" Gap.
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SHEAR, No. 296 Niagara, 8'x14 gauge capacity, motor drive, 3-60-220 A.C.
DRILL, No. 4 Colburn Manufacturing Type, 4 spindle, capacity 2" hi-speed drills.
LATHE, 48" x 20' Betts-Bridgeford, geared head, motor drive 3-60-220 A.C., with rapid traverse, taper attachment, etc.
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Miscellaneous

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Hammer, 600 lb. Erie, single frame.
Lathe, 30" x 16' Lodge & Shipley, 3 st. cone.
Lathe, 18"x8' Hendey, cone head, tie bar.
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Press, No. 66 Consolidated, straight side, geared, 6" stroke, 15,000 lbs.
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Shear, 11'x16 gauge Canton, under dr.
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2—18" Libby Heavy Duty Turret Lathes, m.d.
2—26" Libby Heavy Duty Turret Lathes, m.d.
1—No. 1-B Foster Turret Lathe, geared head.
1—No. 2-B Foster Turret Lathe, geared head, with auto. chuck.
1—No. 4 Cincinnati Vert. Miller, feed in knee.
1—No. 4-B Heavy Brown & Sharpe Plain Miller.
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1—No. 2 Mfg. Milwaukee miller, double overarm, friction clutch, Timken bearings, late standardized spindle nose.

4—No. 4 Cincinnati plain millers, rectangular overarm, intermittent feed, power rapid traverse.

4—48" Cincinnati plain and duplex automatic millers, worm driven with intermittent feed, power rapid traverse and motor drive.

1—No. 1404 duplex Mil-Waukee-Mil. Timken bearings, late standardized spindle nose, motor in base.

5—No. 3 Abrasive surface grinders, motor in base type.

4—No. 2 Cincinnati centerless grinders, motor driven.

4—52" King boring mills, late type with power rapid traverse and motor drive.

1—3" bar, No. 31 Lucas horizontal boring mill. Extra long bed, extra large table, motor drive.

8—American geared head lathes. Sizes:—14"x6', 16"x8', 18"x8' and 20"x8'.

2—18"x8' Lodge & Shipley geared head lathes, with taper attachment.

3—Brand New Cisco geared head lathes at used lathe prices. Sizes:—14"x6', 16"x6' and 18"x8'.

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No. 0 Giddings & Lewis Horiz., 3" bar
4" Bar Lambert
Boring Mills, 24", 36", 42" Bullard "New Era"
32" and 42" King
48" and 54" Colburn
61" Bullard, "Maxi-Mill"
62" Colburn, Heavy Duty, M.D.
72" Colburn, motor drive
72" King Vert.
10' Niles, belt drive
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1, 2, 3, 4, 6 spdl. Leland-Gifford
1, 2, 6 spdl. Henry & Wright
24" Cincinnati, slid. head
Boley multiple drillers and tappers
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3' Western, Timken Brg.
4' Western, heavy type
4' Cincinnati-Bickford, M.D.
5' American, full univ. M.D.
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No. 1 & No. 2 Schuchardt & Shutte
Nos. 9-H, 18-H Gould & Eberhardt
No. 36-BM Gould & Eberhardt, 3 spindle
Nos. 6, 61, 65, 612, 615 Fellows
6" and 18" Gleason bevel gear
37" Gleason bevel gear planer
Grinders, 6"x32" Norton plain, M.D.
10"x24", 36", 50", 72", Norton, plain
10"x36", 52", Landis, plain
14"x36", 72", Norton, plain
18"x96", Norton, plain, M.D.
20"x120", Landis, plain, M. D.
20"x168" Landis, plain, M.D.
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No. 2 & No. 2½ Universal (Bath type)
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No. 1½ Landis, Internal
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No. 3—48" Diamond Surf.
No. 2 Brown & Sharpe Surface
No 3 and No. 33 Abrasive vert. surf.
No. 16—26" Blanchard vert. surf.
No. 10—16" Blanchard, M.D.
14"x36" Pratt & Whitney vert. surf. Mod. "B"
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36"x84" Diamond face, hyd. fd.
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13"x6' LeBlond, hvy. duty grd. hd.
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20"x8', 12', 14', L. & S., sel. grd. hd.
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No. 2M Cincinnati, plain
No. 2, No. 3 Cincinnati, high power, plain
No. 3-B, No. 4-B Heavy Brown & Sharpe, pl.
No. 3-B, No. 4-B Milwaukee, plain
No. 4 Cincinnati, plain, high power
No. 2-A Brown & Sharpe Universal
No. 2-B Milwaukee Universal
No. 3-GS Hendey Univ., S.P.D.
No. 3, No. 4 Cincinnati high power, Universal
No. 2 and No. 3, Cincinnati hp. Vertical.
No. 4 Cincinnati high power Vertical
18" & 24" Cincinnati Auto. Duplex
No. 4 Lees-Bradner Thread
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26" Lynd-Farquhar O.S. planer, shaper
30"x30"x6' Cincinnati
36"x36"x10', 12' & 24' Gray
36"x36"x8' Cincinnati
48"x48"x14' Liberty Open Side
56"x56"x32" Cincinnati, 4 heads
72"x72"x12' Cincinnati, 4 heads
Presses, No. 20 Bliss O.B.I.
No. 4 Consolidated, O.B.I.
No. 106 Bliss Gap Frame
No. 95-E Toledo, obl. crank
No. 96-F Toledo obl. geared
No. 94-I Toledo obl. crank
50-ton Henry & Wright Dieing mch.
Shapers, 16" & 25", Smith & Mills
20" Gould & Eberhardt S.P.D. late type
20" American, S.P.D.
24" Rockford, S.P.D.
24" American, S.P.D.
24" Gould & Eberhard, S.P.D.
Turret Lathes, No. 1-A Warner & Swasey
No. 3-A Warner & Swasey
18" Libby
26", 7½" Libby
No. 4-L Gisholt 9¼" H.S.
Miscellaneous—10' Obi Brake
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No. 400 Toledo Shear, 3/16" cap.
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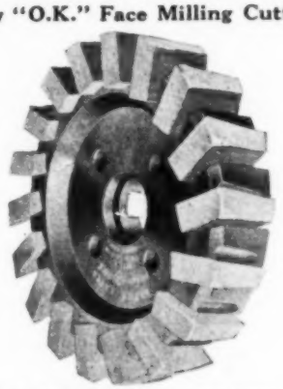

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7"	1¼	16.00	14"	1½	50.00
8"	1¼, 1½	20.00	16"	1½	70.00

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All Rapid Traverse—motor Drive.

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42", 36", 24"

AUTOMATIC SCREW MACHINES
2" Gridley Model "G" 4 Spindle, Motor Drive. Used less than 100 hours.

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No. 4-B and 2-B Brown & Sharpe.

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No. 2 Cincinnati, S.P.D.
No. 1 and 1½ Brown & Sharpe Cone.

MILLING MACHINES VERTICAL
No. 4, 3, 2 Cincinnati, High Power

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No. 65 Heald.
No. 61 Heald.
No. 1 and 2 Brown & Sharpe Universal.
No. 2 Oakley Universal.

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36"x36"x8' Detrick & Harvey Openside.
24"x24"x6' Pease.
16' Southwark 1¼" capacity, Motor Drive.

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96"x54' Niles-Bement-Pond, Motor Drive, 2 carriages.
42"x26' American, Mot. Dr.
36"x32' LeBlond, Belt Drive, 2 carriages.
36"x32' Simplex, Mot. Dr.
26"x24' Putnam, Belt Drive.
24"x24' Reed, Belt Drive.

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1, 2, 3, Spindle Avey Aveymatic, Leland & Gifford, etc., high speed Drills.
24" and 30" Snyder, Cincinnati, Aurora, Drills, tapping attachment.

MILLING MACHINES
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(Continued on facing page)

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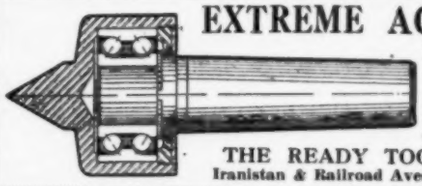

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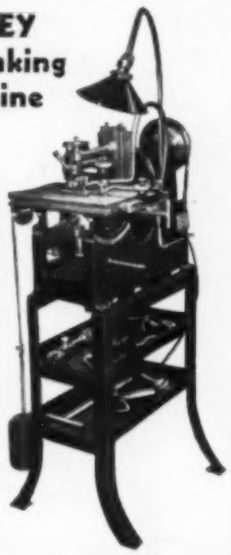

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Pratt & Whitney Co.
Ruthman Machy. Co.

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Carlton Machine Tool Co.
Cincinnati Bickford Tool Co.
Fosdick Machine & Tool Co.
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Morse Twist Drill & Mach. Co.
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GAGES, Comparator
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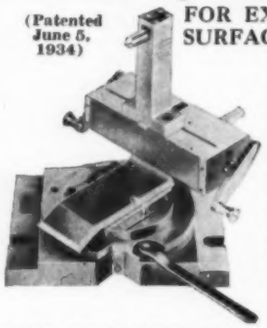

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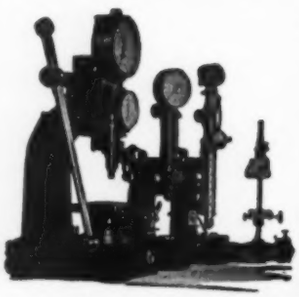

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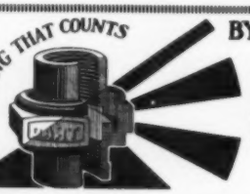

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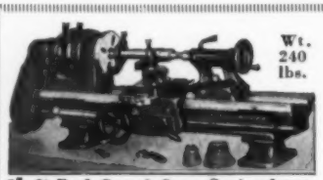

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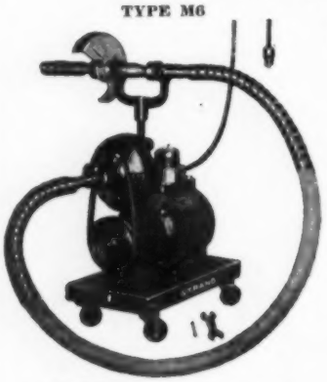

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MILLING Machines, Precision Bench
Hardinge Brothers, Inc.

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Automatic Machine Co.

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Potter & Johnston Mach. Co.
Ryerson & Sons, Jos. T.
Sidney Machine Tool Co.

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Kearney & Trecker Corp.
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Potter & Johnston Mach. Co.
Reed-Prentice Corp.
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Cleveland Auto. Mach. Co.
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Stuart Co., D. A.

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Socony-Vacuum Oil Co.
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Consolidated Mach. Tool Corp.
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Putnam Machine Co.
Ryerson & Sons, Jos. T.

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Dumore Co.
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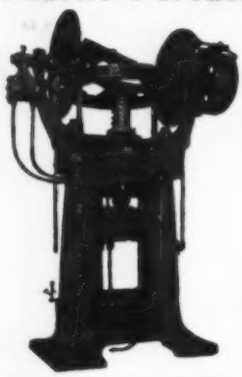

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American Machinist

SEPTEMBER 25, 1935

MACHINE TOOLS POINT THE WAY

"I AM ashamed to go back to my shop with its 30-year-old machine tools," admitted the machine shop superintendent of a big steel company after a day at the Machine Tool Show. Unfortunately for him his company is one of those that believe in the immortality of a machine tool.

"Two days out here have cost me just $100,000," remarked the head of a New York company who profits through following the advice of his superintendent where equipment purchases are involved. One of the tools *he ordered* will be shipped from the floor when the Show closes. Incidentally, many of the exhibitors at Cleveland sold some of their show machines, several disposed of all of them.

Enthusiasm and optimism both were at a high pitch from the very first. The machine tool builders knew that their confidence in their new machines was justified, but they were totally unprepared for the eagerness displayed by the visitors who came to study and compare in order to get the most for their money, even though many orders will not be placed until long after the end of the exhibition.

On every hand you could hear admiring comments on an industry that had the nerve to spend the money to get ready for and put on such a show as this one turned out to be. Many a prospective customer after a good look at the new models said flatly that this show represented a turning point in mechanical history. Don't discount those statements, no matter how extreme they sound. They are really restrained in comparison with some that were made by men of long experience in the machinery business.

A few visitors objected to the size of the show, and no wonder, for it occupied the whole available space in the Public Auditorium and Exhibition Halls—235,000 sq.ft. "Too much acreage," one engineer complained. But even so, although the doors did not open until nine, eager observers had found their way to the farthest exhibits by a quarter past.

K. T. Keller (under the gray hat) has a perfectly swell afternoon at the Pre-View looking over machine tools, far away from the paper work of a corporation president

Recovery would rule the heavy industries if all of them were as optimistically aggressive as the builders of machine tools. Their courage in planning the Cleveland Show — a year ago — deserves the acclaim it is receiving, and the success the Show achieved

The Pre-View for major executives, bankers, journalists and educators that preceded the official opening of the exhibition exceeded the expectations of the pessimists, fell short of the hopes of the optimists. Distinguished guests were met by a reception committee of leading machine tool builders and were conducted in small groups to the various exhibits, the first stop being at the booth of the *American Machinist* where a graphic presentation of the 1935 Inventory of Equipment in the Metal-Working Industry was explained briefly to afford a background for the economic opportunities offered by the new machine tools to be seen later.

At the invitation dinner in the evening President C. J. Stilwell of the National Machine Tool Builders' Association introduced as toastmaster President R. E. Flanders of the American Society of Mechanical Engineers, who in turn introduced the speaker of the evening, Thomas J. Watson, president of the International Business Machines Corporation. Each man sounded a keynote of optimism in his own fashion. Extracts from their speeches will be found in the panels. Among their hearers were most of the leaders of the machinery industry of this country. There has probably never been a more representative gathering of such men.

The strategy of the machine tool using companies seemed to be to send the top executives to have a look around during the first week, and then to have the works managers, superintendents and tool supervisors follow after to mop up. Thus K. T. Keller, Chrysler president, came to the Pre-View and enjoyed himself thoroughly among the machine tools which he

knows so well. His subordinates came along later. The manufacturing committee of the General Electric Company met on the first day and looked things over. Nearly 150 of the superintendents and other tool men came during the second week. A. W. Robertson, chairman of Westinghouse, was at the Pre-View, as were some of his leading manufacturing chiefs. Others followed later on.

Some 50 engineers from Russian commissions examined the new models with characteristic thoroughness. Double that number of Germans, many of them machine tool builders, came to see what they could see. Delegations from other countries were less imposing.

Technical sessions of the Machine Tool Congress were well attended, some of them setting new records for the participating engineering societies.

As for the show itself no published account can do it justice. Machines that were of outstanding importance to some visitors were of slight interest to others. Accuracy was the criterion of some observers, productive capacity appealed to others, convenience of control to still others. One large buyer was accused of bringing a stethoscope to aid him in his search for quiet running gears.

One of the General Electric works managers after watching the almost inconceivable speed of some of the small automatic screw machines delivered himself of this more or less serious observation, "It won't be long now before we stop figuring direct labor on a job, and just consider it as a percentage of material cost."

The remarkable speed of actual cutting has brought along with it a great improvement in holding devices in order to cut down set-up time. It has also forced the designers to pay meticulous attention to controls in order to make them as convenient as possible and with the maximum number of functions under control of a single lever or electrical push button or relay.

The more thoughtful observers of

R. E. FLANDERS

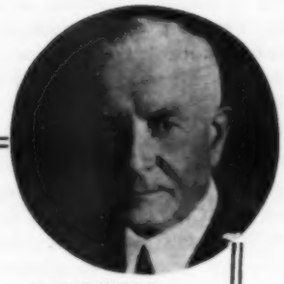
THIS is no ordinary occasion and this is no ordinary group of guests. The men, singly and as a whole, who have honored us by their presence tonight could not be gathered together for anything less than an event of prime significance. That significance very clearly lies in the essential nature and recent history of the Machine Tool Industry.

Experience has shown that the sensitive machine tool curve tends to give some advance information as to the trend of general business. We are all here tonight happy in the knowledge that the curve started rising many months ago, and now stands at the highest point in its recovery. For you and for us the immediate future seems assured.

We rejoice that our industry is the servant of competitive industry. We are convinced that competition of the type which is known and practiced by those gathered in this room tonight is the kind which permits survival only to those who make more and better goods and sell them to the consuming public for less money.

When to this useful service is added the further fact that competition of our kind increases the volume of business and in consequence increases the demand for the skill of the worker, the engineer and the administrator. we have the only solid foundation and effective impelling force which can initiate and maintain a rising scale of wages.

One small section of the biggest industrial machinery exhibition ever staged in this country. It covered over five acres of space



T. J. WATSON

IN visiting your show this afternoon I was impressed by many things and I thought of one thing that I heard Dr. Nicholas Murray Butler say not long ago. He said, "I would divide the population of this country into three groups—a small group who make things happen, a larger group who watch things happen, and the enormous multitude who do not know what happens." I thought, in this machine tool industry there is a group of people who make things happen, and that is what we have needed for some time.

I am sure I can speak for all others who do business with you when I say that we could not possibly have existed nor have gotten where we are in any of our businesses had it not been for the ingenuity, the skill and the courage of the people in the machine tool industry. I am sure that anyone who will go over to your exhibition and see what you have produced during these years of depression will be impressed not only with the skill that was required to put on that show but also with the courage to spend money for development work during this period of depression.

You can't find an industry in the United States today that has the equipment it ought to have, and I am looking forward to our own people finding enough things here in your exhibition to put our equipment in 100 per cent efficient condition.

the advances in this direction are beginning to wonder how they were going to educate operators in the handling of these new units. On some of them failure to concentrate for as short a period as a second or two might lead to an expensive tool failure or worse. Our readiness to leave the problem of training for some one else to solve may cost us dearly if we do not take care.

One of the major trends evident at the show was the rounding out of the lines of various builders. The time for narrow specialization has evidently passed, and with it many of the limitations on the employment opportunities for engineers. Most machine tool building companies are increasing their designing and research staffs, some from 20 to 40 per cent, one over 300 per cent in the last year.

Complicated gear trains result from the many changes of feeds and speeds on modern machine tools. Such gear trains require more space and are difficult to make accessible. Although very ingenious methods have been developed to ensure easy, foolproof control of feeds and speeds the internal mechanisms therefor are often complicated and costly to make. Greater care must be taken to assure adequate lubrication. Larger lubricant sumps, and means for dissipating heat may result in heavier and larger castings than might otherwise be required. For some classes of machines, therefore, it is likely that ready-made variable speed drive devices will be purchased by the machine tool builder and coupled to a simple train requiring less space, less complicated castings and fewer machining operations. Several such applications have already been made.

Ground gears are finding more extensive use on high class equipment. Gear noise is inconsistent with otherwise precision manufacture. Observation of similar types of machines at the show, some with ground gears and others with unground gears, made evident the factor of gear growl in judging the quality.

Electric controls are being used in combination with hydraulic controls to

Booth of American Machinist *which was the first stop of Pre-View guests so that they might get a dramatization of the need for modernization*

afford remote control of the moving element. The electric controls lend themselves to remote control applications better than fluid moving through comparatively long distances. They also help to simplify the overall construction. Thus the hydraulic cylinder or valve is free to function directly at the point of application, giving the desired simplicity and compactness at relatively low expense.

Hydraulic chucking is gaining favor. It can be so tied in with the machine cycle that either semi-automatic or full automatic operation can be secured.

Turning steel with cemented carbide tools in automatics is expected to be a major accomplishment in the next five years. Most of the present machines have been built with speeds and feeds in high enough ranges for this purpose. Some modifications will prove necessary as experience is gained with the cutting material.

During the past five years machine tool builders have increased the weight of their machines by 25 to 50 per cent as a fair average, and much more in many cases. What this has meant in rigidity is apparent on the closer tolerance maintained on the work. Noise has been reduced. Cast iron is relatively cheap compared to the general cost of fabrication.

Rigidity comes about from design as well as weight. Instead of overhanging elements the tendency is to straight-sided construction. Thus stresses are carried straight down to the bed.

Bed, column and slide ways are wider spaced, heavier and allow more rigid clamping. Lubrication is improved. Circular ways are being tried out by one concern. Hardened steel ways are being more generally used, some ground before installing, others ground in place.

Welded construction of special machine parts, and parts that are made one or two at a time has gained favor. Nickel iron mixtures are widely used for castings. Experimentation with alloy steels continues in an effort to get ones that respond best to heat-treatment.

Means to assure toolroom tolerances in production work, particularly where small lot manufacturing is the rule, are being adopted on machines of the jig boring class (drilling machines are a good example). Thus by building the machine to closer tolerances and through use of end measures tolerances closer than customary are secured, but at a fraction of the cost of work done on the jig borer.

Built-in lighting fixtures are becoming rather general, and the increased use of indicating instruments is an indication that the demand for measurement of performance and power consumption is being recognized.

This wider use of the tougher and harder materials has had the effect of slowing down the reduction in number of machine tools in use which would have been considerable had the softer and more easily machined materials remained in favor. Thus the increased capacity of machine tools has been passed on indirectly to the consumer through the improvement in the things he buys caused by the use of better materials.

The Machine Tool Show of 1935 is history. It was courageously planned, excellently managed and splendidly supported. Let us look forward to others like it, but not too often.

SHOW STATISTICS

Number of Exhibitors	238
Machine Tool Builders	120
Number of Machines	900
Machines Under Power	600
Value of Exhibits	$3,000,000
Area of Exhibits	235,000 sq.ft.
Weight of Machines	2,500 tons
Horsepower Required	6,500

Mr. Swasey tells Col. Deeds about telescopes. Many leaders of industry visited the Show on Pre-View Day to get first-hand impressions

WELDS at WATERTOWN

Are used in fabricating gun carriages where resistance to shock and vibration is vital. The first of two articles tells of studies made to improve these characteristics

W. L. WARNER

Welding Engineer, Watertown Arsenal

IT HAS been said that "a job is only as good as the man who makes it." How often one hears this idea expressed in connection with welding, and yet there are other details to consider besides the man who is to do the job and his capabilities.

Sometimes the job is not as good as the man who makes it. Perhaps there is a lack of incentive; or limitations of working conditions may be disagreeable. An indifferent attitude on the part of management toward details of procedure may exist as well as a desire to obtain cheapness at the expense of quality workmanship. These items are difficult to evaluate, and yet they play an important part in the application of the welding process. In many respects, welding is similar to other methods of manufacture in that it requires a thorough understanding of its application and a suitable control of that application.

These remarks will be confined primarily to metallic arc welding, although, to a certain extent, some of the principles involved apply as well to other fusion welding methods.

As generally understood by the trade, fusion welding involves the use of heat in some form. The effects of this heat on the metal of the parts being welded and the weld metal of the joint itself will depend upon the metallurgical character of the metals, the method used to apply the heat and the manner in which the weld is made by the welder.

It is said that "there are tricks to every trade," and most certainly is this true of welding. However, once these tricks are understood by a properly trained personnel, with a suitable organization properly controlled, welding is as dependable as any other method of manufacture.

At Watertown Arsenal, we are engaged in the building of gun carriages and parts therefor. These structures are built with the object of producing maximum strength and resistance to shock and vibratory loads with a minimum weight of material. On the 3-in. AA gun mount, with which this discussion is primarily concerned, the welds are of the fillet type and most of the plate used is ¼ in. or under in thickness.

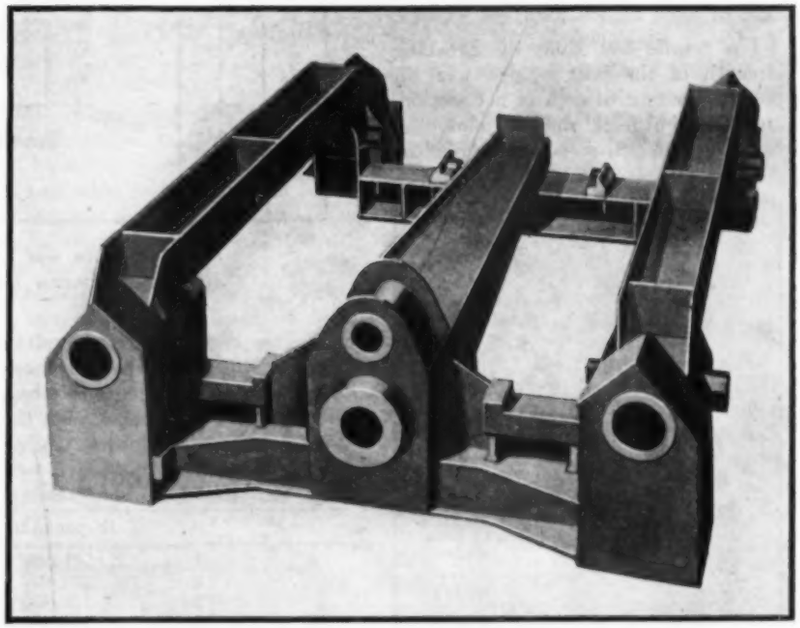


Fig. 1—Typical of the gun mounts made at Watertown is this rear bogie of the 3-in. AA mount made from nickel steel plates

Fig. 1 shows a typical part of a gun mount fabricated by welding flat structural 3½ per cent nickel steel plate parts which have been gas cut and formed to shape. Some idea of the intricate welding job required on this work may be obtained from this illustration. Each of these structures is examined by X-ray, followed by a careful visual inspection of all welds.

It should be recognized that, in order to produce a dependable welded product, two conditions are essential:

1. It must be properly designed for welding;
2. It must be properly welded.

Of these two items, emphasis is usually placed on the latter, and often the former is left out of the picture.

The primary objective of our welding studies at Watertown Arsenal is threefold:

1. To determine dependable design data;
2. To determine proper welding procedure and materials to use;
3. To establish definite standards for procedure control and inspection of welds.

For the purpose of determining the strengths of welded joints and the relative effects of details of welding procedure, we make both tensile and tensile impact tests on butt and fillet welds. Because of the fundamental differences between the two types of joints, different forms of specimen are necessary.

Fig. 2 shows the two forms of specimen used for butt welds, and Fig. 3, the two forms used for fillet welds. The method of preparing these specimens and the test procedure used are described in an article by the writer

printed in the *Journal* of the American Welding Society for June, 1934, pages 15-23.

As yet, no suitable tensile impact test specimen has been devised for testing fillet welds longitudinally. The fillet weld test specimens shown in Fig. 3 are most suitable for testing welded joints of the types which are used to a large extent in ordnance structures built at Watertown Arsenal. Also, the examination of fillet welded joints of this type by X-ray permits of more accurate interpretation than any other type of fillet welded joint.

The tensile test gives the breaking strength of the butt welded joint in pounds per unit of area of net section, and for the fillet welded joint, the breaking strength in pounds per linear

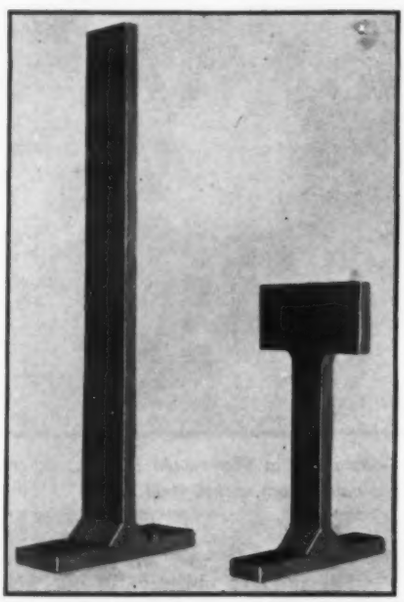
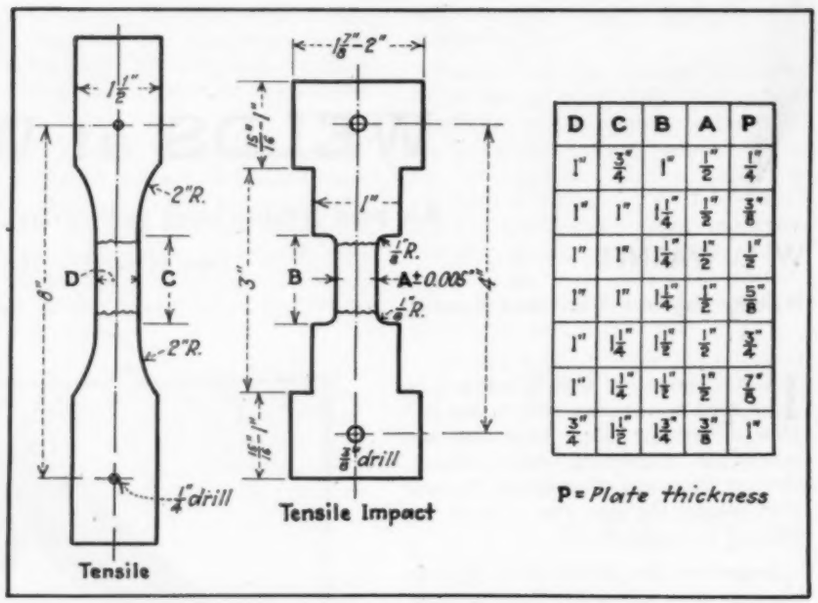


Fig. 3—Fillet welds are tested using the forms illustrated. That to the left is for tensile and that to the right is for tensile impact determination

inch of joint. Either of these values can be used by the designer.

The tensile impact test gives the energy in foot-pounds required to rupture the test specimen. The test data are used for comparative purposes, to compare details of welding procedure, effect of weld contour, or influence of welding materials on the ability of the joint to resist rupture under dynamic loading. The tensile impact test as made here includes a section of the entire welded joint rather than a section of part of the joint. In this respect, it is felt that the tensile impact test as described gives a better indication of the serviceability of the joint.



D	C	B	A	P
1"	3/4"	1"	1/2"	1/4"
1"	1"	1 1/4"	1/2"	3/8"
1"	1"	1 1/4"	1/2"	1/2"
1"	1"	1 1/4"	1/2"	5/8"
1"	1 1/4"	1 1/2"	1/2"	3/4"
1"	1 1/4"	1 1/2"	1/2"	7/8"
3/4"	1 1/2"	1 3/4"	3/8"	1"

Fig. 2—Tensile and tensile impact tests require entirely different specimens. Here are those adopted for butt welds

The tensile impact test is quite critical and will show up differences between welds which the tensile test will not reveal. For example, note the figures given in the following table:

Electrode	Weld	Tensile	Elongation	Tensile Impact	Fracture
		lb. per sq.in.	Per cent in 1 in.	Ft.-lbs.	
A	1	101,600	18	564	silky
	2	102,400	19	278	plate laminated
	3	100,000	14	271	coarse crystalline
B	1	100,000	19	730	silky
	2	103,600	18	529	silky
C	1	99,000	10	655	silky
D	1	94,000	12	443	silky
	2	102,000	16	749	silky

These results were obtained from butt welds on ¼-in. structural 3½ per cent nickel steel plate in the "as welded" condition. The weld reinforcement was machined off, and the electrodes used were commercial brands of covered low carbon.

It will be noted that the tensile results are quite uniformly high and show a maximum variation of about ten per cent of the minimum (weld D-1). From the tensile test results, one would select weld D-1 as the poorest, and yet this weld shows a clean silky break indicative of good weld metal.

If now we examine the tensile impact values we find that the two low values (welds A-2 and A-3) coincide with bad defects in the joint fracture which had no effect on the tensile properties. It is, therefore, evident that from the tensile impact test results one would reject two welds, whereas, none of them would be rejected on the basis of the tensile test results. Furthermore, this rejection coincides with bad effects in the welded joint, the effects of which were not shown by the tensile test values.

Comparing the tensile impact specimen shown by Fig. 2 with that shown in the June, 1934, issue of the *Journal* of the American Welding Society, page 17, it may be seen that the specimen of Fig. 2 is a modification of the older form in that the dimensions *A* and *B* are smaller and vary with the plate thickness and width of the weld. This new form of test specimen resulted from a series of tests on unwelded plate metal made to determine the shape of specimen which would give more uniform test results and eliminate variations caused by the specimen itself.

To illustrate this point the following tensile impact data on unwelded ½-in. structural plate are given:

Material	Old form Ft.-lb.	New form Ft.-lb.
Carbon steel (0.20 C)...	1506	711
	1654	730
Nickel steel (0.35 C)....	1451	836
	1744	836

In this comparison all four speci-

mens were taken from one piece of plate in each case. The effect of the newer form of specimen is quite apparent.

Other tests of unwelded plate, selected at random, may be cited as follows:

Material	Old form Ft.-lb.	New form Ft.-lb.
½-in. nickel steel plate....	1805	783
	1798	783
¼-in. nickel steel plate....	900	316
	800	316

These results should be sufficient to indicate the greater uniformity of test data obtainable with the new form of specimen. Some variation between different sheets or plates may be found, possibly caused by differences in thickness, heat-treatment and rolling procedure, but it is essential that the test section of the specimen be accurately machined to the length and width specified.

Mr. Warner will conclude this article in an early number.

Small Lot Stampings at Low Cost

K. W. PETERSON
Dayton Rogers Manufacturing Company

In producing thin metal stampings in small lots, a very simple method may be followed by the use of standard equipment such as found in the average shop equipped with punch presses. This method, in most cases, is limited to thin stock from 0.001 to 0.012 in. thick. However, sheets from 0.025 to 0.030 in. have been handled in some instances with considerable success. Dead soft material, however, does not work satisfactorily. Whenever the part lends itself, hard tempered sheet stock should be used.

Let us assume that fifty parts are required, as shown in Fig. 1, of 0.010 in. half hard cold-rolled strip steel. All that is necessary as far as special tooling is required in this case is to use a piece of ⅛-in. either cold-rolled strip steel or flat ground tool steel of the same thickness. Make what is virtually a template, of the same size and dimensions as that of the desired stamping, being sure to leave one edge of this templet-like punch sharp with a slight taper toward the top as shown in *A*, Fig. 1. If this punch is made of cold-rolled strip steel it should be cyanide case hardened and quenched in water. If made of tool steel it should be hardened and tempered.

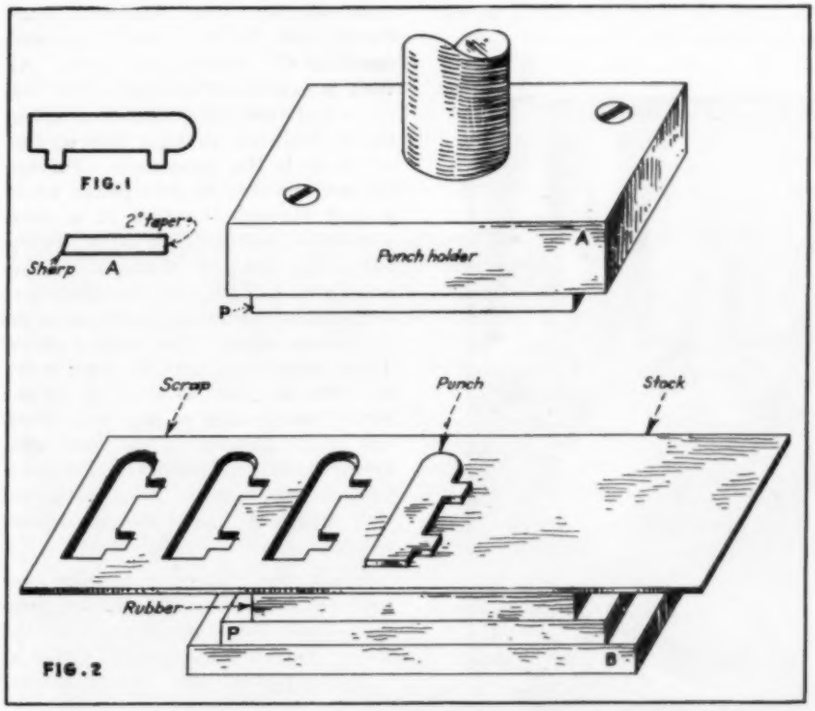


Fig. 1—A sample piece and the form of punch used to make it. A sharp edge and clearance are important. Fig. 2—Punch holder and bolster used on short run work. Diaphragm rubber is used under the sheet being punched.

A flat punch holder at *A*, Fig. 2, may be mounted in the ram of any punch press, such as shown in Fig. 2, together with a smooth bolster plate *B*. Place a piece of ⅛-in. diaphragm rubber about 6 in. square on the bolster unit. On the rubber place the stock to be blanked. Place the blanking punch on the stock in any given position.

In this press operation the blanking punch is forced through the stock into the diaphragm rubber to such a depth that the rubber serves as a female die, and thus breaks or cracks the stock loose around the profile of the blanking punch. While the edge of these blanks is not as smooth as those produced with ordinary blanking dies, it will serve the purpose in the majority of cases. It will also be found that the work cannot be nested together as closely as with usual die practice because the diaphragm rubber has to have material enough around the blanking punch to grip the stock.

If much of this work is anticipated, it is advisable to face both the cast-iron punch holder and the cast-iron bolster with hardened and ground tool steel plates about ½- to ⅝-in. thick, with large enough area to take care of a maximum job. These plates are shown at *P* in both *A* and *B*, Fig. 2. Both the punch holder *A* and press bolster *B* can be made of cast iron.

This method will be found very economical in producing thin shim washers and other thin shim parts. Piercing has been done in some cases at the same operation, by providing the desired size punch in properly located holes in the templet-like blanking punch.

Truing Centers in Work

FRANK C. HUDSON

Wm. Betz called attention to an important point in his article (*AM*—Vol. 79, page 534). It may pay to consider the practice of at least one maker of lathe centers, of coating the points of his centers with Stellite or some of the other hard materials now available. While this presents something of a problem in the case of internal centers, as in work mandrels, it might pay where the centers are large enough.

It might also be worth while to consider the insertion of hardened tool steel internal centers by shrinking or freezing. This in case it is not feasible to case-harden the end of the mandrel sufficiently, for any reason.

LATHE PARTS UNDER FIRE

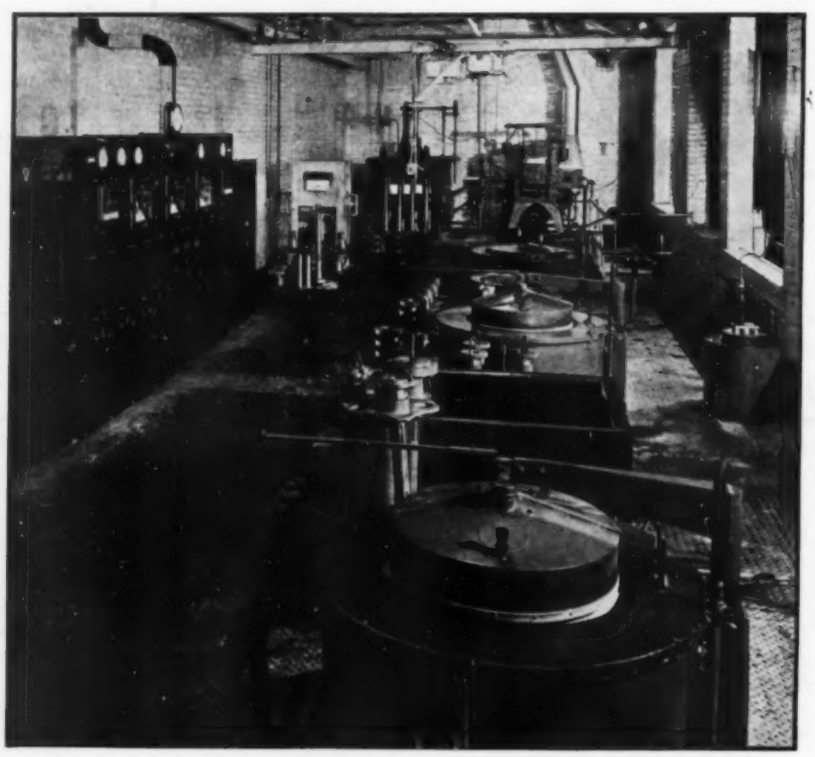
FRED H. COLVIN
Editor, American Machinist

Monarch wanted close-controlled heat-treatment of spindles and sleeves, clutches and gears. Result: A brand new hardening room and a modern testing department

ALMOST 50 years ago a lathe builder boasted that he did not have a micrometer in his shop. His lathe had an excellent reputation in its day, and his boast was intended to reflect credit upon the skill of his machinists. Needless to say, he has long been numbered among the missing; his lathe is remembered only by a few old-time mechanics.

In striking contrast to the methods of those days is the pride taken by modern shop management in the excellence of its equipment. A good example is the plant of the Monarch Machine Tool Company. This concern has just revamped its heat-treating facilities by installing the latest equipment for this purpose.

A view of the new heat-treating set-up is shown in the accompanying illustration: two Hump Vapocarb electric hardening and carburizing furnaces are shown in the foreground. Beyond them is a Leeds & Northrup Homo electric air-tempering furnace for drawing gears and other parts after quenching. In addition to the electric furnace equipment, the department is provided with a small gas forge heating furnace, two box-type auxiliary gas-fired furnaces, an oil quenching tank, an electrically heated Oakite wash tank and a water cooling tank. Provision has been made for the installation of an insulated soaking pit at a later date.



Compact, yet with plenty of elbow room, this heat-treating set-up is so conveniently arranged that one man can operate it

The new department is housed in a separate well-ventilated room, 62x18 ft. At one end are located the fuel-fired furnaces. The three large electric furnaces, the two electric gas generating units for atmospheric control, together with the oil quenching tank, the washing tank, and the water tank are set vertically in a specially constructed pit 7 ft. deep, 12 ft. wide and 42 ft. long. These are all arranged with their tops at the same convenient working level, less than waist height above the floor.

This set-up permits the operator to walk completely around each unit to inspect gas lines, thermo-couples, and overheat protection fuses. Suitable lighting and drainage facilities are provided in the pit where the heat exchanger and oil circulating system are also conveniently mounted. The pit is reached by iron stairs at one end.

The surface of the floor is of wood blocks, with non-skid iron plates surrounding the furnaces and tanks. All work is handled in and out of the furnaces and quenching tanks by a motor-driven overhead traveling hoist serving all points in the department. Furnace lids are operated by foot pedals which project through the floor at a point directly in front of the furnaces. To the left of the furnaces in the illustration are the control panels where Micromax temperature control apparatus keeps the continuous record of the furnace cycles. These records are kept for each batch of parts and act as a check in the event that trouble of any sort develops later. Because of the convenient arrangement of furnaces and furnace control, one man is able to operate the complete heat-treating department.

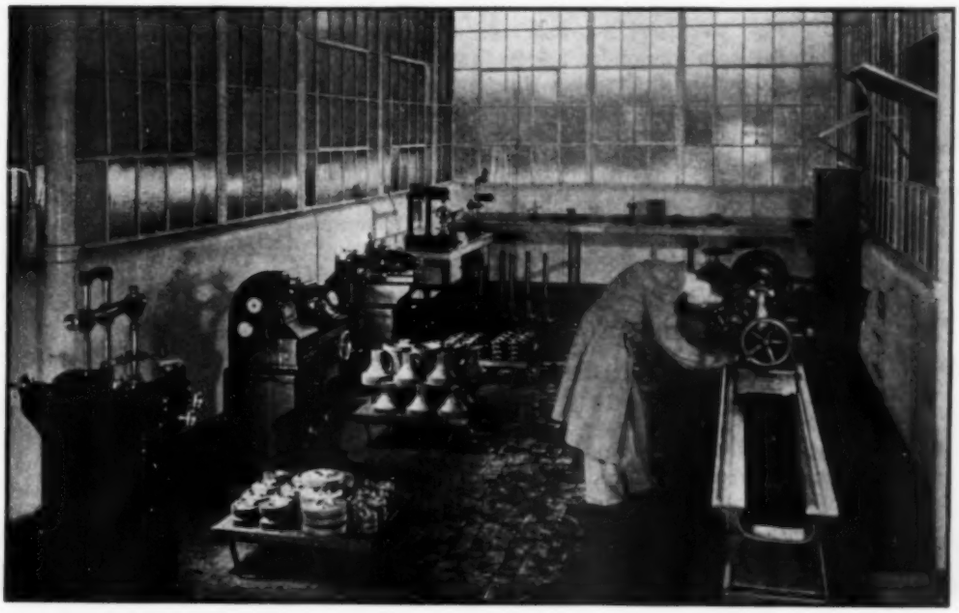
When the Vapocarb furnaces are used for carburizing, the correct gaseous atmosphere is maintained by the use of Vapocarb fluid, which is fed at a predetermined rate into a cracker

An easily controlled electric hoist plus carefully designed holding fixtures contribute to efficient work handling

furnace kept at 1,500 F. Here the fluid drops on a hot plate and is piped to the two furnaces. Beside each furnace is a vent pipe through which the surplus gas escapes where it is lighted and serves as a tell-tale on the atmosphere of the furnace. As long as the flame is maintained, it is known that no air is present in the furnace which practically eliminates the formation of scale.

The amount of fluid necessary depends on the kind of steel used. All headstock and tailstock spindles and all spindle sleeves for Monarch lathes are carburized and hardened to a uniform hardness of 60 to 63 Rockwell C Gears, clutches, shafts, racks, pinions, and other heat-treated parts are oil hardening SAE 2350 steel, tempered in the Homo furnace. The gears are quenched in oil and drawn for three hours at 525 F., which gives them a Rockwell C hardness of 48-50. Bores of gears are ground and tooth contours are lapped after hardening. Centers are made of carbon tool steel with a carbon content from 0.90 to 1.05. Special holders are used for handling spindles, gears and other parts in the furnaces. Some of these may be seen in the illustration. A special hairpin type carrier has been developed for handling three gears in and out of the furnace simultaneously.

Before the parts go to the assembly



Hardness and accuracy are double checked in a glass inclosed test room

Precision in the finished part is insured by the steps illustrated. From top to bottom they include tests for the involute profile of gears; lead of helical gears; normal pitch and tooth spacing; and Rockwell hardness

department they are checked for hardness and accuracy. Equipment for this purpose includes a device for testing involute profile of all gears, another for checking the lead of the helix angle on helical gears, while another determines the accuracy, both of normal pitch and tooth spacing of helical gears. All three of these instruments are made by the Illinois Tool Works.

Hardness is tested by a Rockwell machine. A Zeiss optometer reading in quarter tenths is used for comparative measurements. In addition, a number of scleroscopes are available. Lead screws are checked 100 per cent by another Zeiss machine which permits Monarch to hold the lead within 0.001 in. per ft., accumulative error.

Do Metals Crystallize Under Vibration?

In published accounts of a recent endurance flight of an airplane, widespread publicity was given to the belief that metals may fail as a result of crystallization caused by vibration in service. According to the Bureau of Standards, this erroneous belief probably originated in an incorrect conclusion drawn from the typical appearance of the fractured surfaces of metals that failed after having been subjected to repeated cycles of service stresses.

It has been known for a long time that all metals in the solid state are aggregates of crystalline grains, generally of microscopic size. It is also known that the original crystalline structure cannot be altered by purely mechanical forces which do not permanently alter the outward form of the metal piece.

When a metal breaks from a single application of a force, the fracture takes place along natural cleavage planes through the crystal grains and the fracture exhibits a characteristic crystalline appearance. In ductile metals, fracture does not take place until after considerable deformation.

However, when metals are subjected to repeated applications of force, fracture can occur without deformation, even in the most ductile metals, if the range or amplitude of the force exceeds a limiting value. For steels this value is generally about 50 per cent of its strength under steady loads, but may be as low as 20 per cent or as high as 60 per cent. This value is known as the endurance or "fatigue" limit. The fracture originates at a point where the stress is the maximum, or in some localized weakness. The crack itself, once started, is a localized weakness and grows with repeated stress application, generally perpendicularly to the direction of the applied forces.

As the advancing crack cuts off more and more of the sound metal, the load is carried by a progressively decreasing area, and finally sudden and complete rupture of the member occurs. The combination of the sudden break with the formation of a fracture which one is accustomed to find in very brittle materials is naturally disconcerting.

To one not familiar with the inherently crystalline structure of metals and the nature of the process of fracturing, it is perhaps only natural to conclude, from the observation of such a fracture that a portion of the metal had "crystallized" and therefore become brittle, and failed unexpectedly.

Removing Concrete Foundations

JOHN E. HYLER

When removing an obsolete machine that has been set on a concrete foundation, it is generally necessary to remove the foundation. To many, the removal of a large concrete foundation is a major problem. They are afraid to break it up by blasting, although it can be done with very little danger.

The use of dynamite is fast becoming an exact science, and it is now well established that small charges correctly used will break up a concrete foundation that is within a few feet of machines in operation without danger to them. Manufacturers of dynamite are able to furnish instructions for its use for such a purpose.

Another method that has lately come into use makes use of hydraulic pressure. Holes are drilled as for blasting and special hydraulic cartridges are placed in them, being connected to a force pump. When pressure is applied, a number of small levers are put out from the cartridges, creating mechanical expansion and breaking the concrete. The process must, of course, be repeated until the mass is reduced to sizes that can be easily handled.

PROGRESS OF INDUSTRY REVIEWED FOR MACHINE TOOL CONGRESS

▼ ▼ ▼

Gratifying attendance figures were reported by the A.S.M.E., the S.A.E., the A.S.T.E. and the Cleveland Engineering Society at meetings during the Machine Tool Show. What most of the speakers had to say is abstracted in the following articles

Modern Cutting Materials Show Big Gain in Use

Because of increasing competition industry is turning to modern cutting materials, according to Roger D. Prosser, chairman, Subcommittee on Metal Cutting Data, the A.S.M.E. In his report "Present Status of Cemented Carbide and Other Modern Cutting Materials," presented before the Machine Shop Practice Division at Cleveland, Sept. 12, Mr. Prosser compared the situation now prevailing with acceptance of the modern cutting materials in 1930 and 1931. His committee sent out about 750 questionnaires and obtained 90 usable replies.

There were 72 firms using cemented tools. The percentages of use of cemented carbide to the total of all tools used, varied all the way up to 100 per cent, as compared with a maximum of 48 per cent in the previous questionnaire. The average percentage of use was 8.3 per cent. This compares with 5.2 per cent shown by the 1931 survey (over 60 per cent increase) and less than 1 per cent shown by the first survey in 1930. If those not using the cemented carbides at all, for one reason or another, are eliminated, the percentage of use is 10.4 per cent as compared with 7.1 per cent shown by the 1931 questionnaire. This appears to be a very substantial increase.

Cobalt high-speed steel was used by 52 firms. The percentages varied up to 89 per cent as compared with a maximum of 85 per cent in the previous survey. There were only 2 using more than 50 per cent, as compared with 8 in the previous survey.

There were 59 users of stellite. The maximum percentage used was 40 per cent as compared with 81 per cent in the previous report. The average percentage was 8.7 per cent.

Charts giving a comparison of the average percentage of use, the total number of users, and the percentages of use, are shown in Figs. 1, 2, and 3. As shown by Figs. 2 and 3, while the total number of users of cemented carbide was practically the same as in the previous report, those using it at all used considerably larger percentages.

It is interesting to note that among the concerns who use the modern cutting materials, an average of nearly 50 per cent of all tools are either cobalt high-speed steel, cemented carbide, or stellite.

It is difficult to draw a comparison on a percentage basis, as to the types of tools on which the cemented carbides are used successfully. The usual lathe and boring mill tools and milling cutters are well established. The value of the cemented carbides for milling operations on cast iron and non-ferrous materials seems to be realized more and more. Sixteen concerns reported such use. A number used planer or shaper tools.

There was a large increase in the number of special tools such as counterbores, reamers, spot-facers, multi-

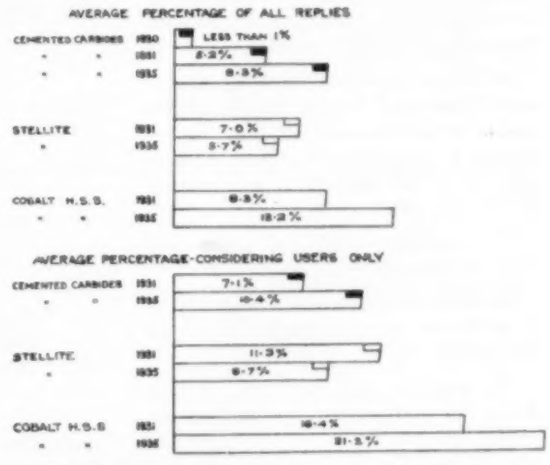


Fig. 1—Average percentage of use of cemented carbide, stellite and cobalt high-speed steel

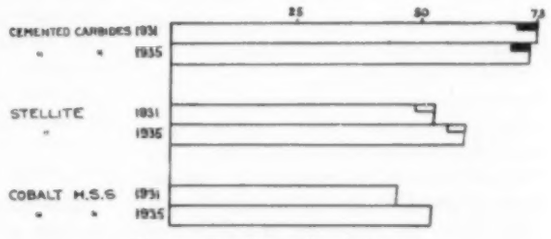


Fig. 2—Total number of users

diameter cutters, and mills. Non-cutting wear-resistant tools and parts faced with cemented carbide, such as centerless grinder rests and spring forming guides, were reported by a number of users. A few reported the use of drills and saws.

The survey showed that use of the cemented carbides is established on cast iron, steel, hard chilled cast iron, brass, bronze, aluminum alloys, and other non-ferrous materials. Use for machining steel seems to have increased in line with the recent improvements in the cemented carbides for steel. Thirty-five concerns reported successfull use on steels, as compared with twenty-six in the previous survey. The use on the austenitic type of stainless steel (18-8), which work-hardens while being cut, seems well established.

Production Increases

On cast iron, the percentages of increase in production being obtained through the use of cemented carbide run all the way from 10 to 200 per cent, the average being about 60 per cent increase.

On steel the average was about 35 per cent. Increases of from 10 to 80 per cent were shown. The fact that the increases on steel were less than on cast iron was doubtless due to insufficient power and speed being available. On new machines with plenty of power and speed, even greater increases than on cast iron are possible.

On other materials, such as aluminum, brass and bronze, special alloys, and other non-ferrous materials, the increases in production ran from a minimum of 15 per cent up to a maximum of 500 per cent.

The savings in cost of production were as follows:

On cast iron the savings ranged from 5 to 75 per cent, averaging about 28 per cent.

On steel the savings ranged from 5 to 50 per cent, averaging about 22 per cent.

On other materials the savings ranged from 20 to 75 per cent, averaging between 20 and 40 per cent.

In reply to the question "Have you appointed a man who has charge of the operation and grinding of all cemented carbide tools?" — fifty-three replied "Yes," twenty-four "No," and the balance did not answer the question. It was noticeable that those who have a man responsible for all cemented carbide tools are obtaining much better results than those who have applied

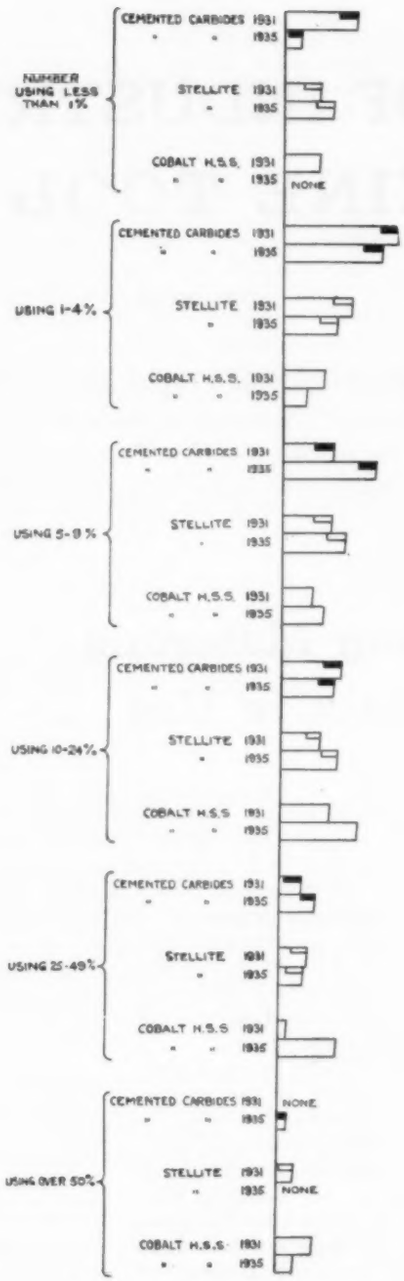


Fig. 3—Number of users in different quantity ranges

them in a more or less haphazard fashion.

About 60 per cent of the users grind their tools by machine as compared with off-hand grinding. It is obvious that in many cases machine grinding must be used, but much time could be saved by the use of off-hand grinders equipped with tables so that the correct angles can be quickly set and accurately maintained.

The time necessary for grinding new cemented carbide tools, if purchased "milled and brazed," varied all the way from five minutes up to two hours, the average being thirty minutes. For regrinding tools which were dull but not chipped, the time required ran from thirty seconds up to an hour, the average being about five to ten minutes. A number, however, required one-half hour or longer. For regrinding chipped tools, the time was from ten minutes up to three hours, averaging about twenty minutes.

While these figures show some improvement since the last survey, they indicate the excessive time which many shops are spending to grind their tools, which is caused either by allowing the operators to grind their own tools, by unnecessary grinding on surface grinders where "offhand" grinding would be satisfactory, or by lack of a suitable double-end grinder with plenty of power, a roughing wheel on one end, a finishing wheel on the other, with a table which can be quickly set to the correct angle, and a reversible motor.

Cutting Speeds

Cutting speeds, feeds and depths of cut being used successfully vary greatly. About all that it is possible to do here is to give an idea as to the average speeds being employed on various materials.

On cast iron, roughing cuts, the cutting speeds ran all the way from 55 ft. per min., up to 500 ft. per min., the average being about 175. On finishing cuts the speeds were from 70 to 580 ft. per min., the average being about 245 ft. per min.

On brass and bronze, the cutting speeds ranged from 150 to 2,250 ft. per min.; average about 510.

On soft steels the speeds ranged from 95 to 400 ft. per min.; average about 200.

On hard steels the speed range was 40 to 300; average 135.

The tendency is towards high speeds and light feeds, in general.

In reply to the question "Can your present machines be used satisfactorily with the cemented carbides?" the replies were about evenly divided in the case of machining cast iron, and it seemed to be the consensus of opinion that about 50 per cent of machines existing in shops today are suitable.

The replies indicated a much smaller percentage of existing machines suitable for use with cemented carbide tools when machining steel. About half of the replies indicated that if business conditions were normal the possibilities of the present cemented carbides would warrant the purchase of new machines.

Why We Have Bought and Will Continue to Buy New Equipment

There are many reasons why this Company finds it advisable to replace old equipment with machines of more recent design, as well as to add equipment incorporating new processes, previously not used in our shops.

The most important reason, from our angle, lies in the fact that as industry and business has become aware of the great advantages to be derived from our tabulating and time recording apparatus, their use has increased in a steadily rising curve. This in turn has created a demand for machines for an ever widening circle of applications and other brand new machines covering work not previously done by mechanical means.

As the function of these machines is becoming more complex, so, naturally, do the machines themselves. This calls for greater and greater accuracy of production; therefore —better, sturdier, and more accurate machine tools must take the place of less adequate equipment.

As the demand for our machine equipment increases, so, naturally, increases the demand for our output capacity. Therefore, we are continuously on the lookout for improvements in the machine tool and accessory trade, for new machines, new small tools, new processes and new ideas that will help us increase our output on an efficient scale.

With the changing trend of times, and the increase in cost of materials, we find it very essential to rationalize the manufacture of our products with an ever vigilant eye, so we need to pass as little as possible of this increase on to our customers and clients.

Thus also, we are able, not only to maintain the earning capacities of our employees, but to give them substantial increases and maintain a good record of compensation for various classes of service that we are very justly proud of. It also enables this Company to take steps in life insurance, recreation facilities and other measures for the health, safety, comfort and enjoyment of our personnel, that has created and maintains an extremely satisfactory relationship between employees and employers.

W. Gumprich,
Manufacturing Engineer
International Business Machines Corporation

All this does not mean that much of the equipment in shops today cannot be used to obtain some or all of the benefits of cemented carbide tools, nor that any of the modern machines now being produced are not suitable, but it does indicate a need for modernization in many shops if they wish to meet competition, as well as a need for still further power and rigidity and other improvements in machine tools, especially for machining steel, where the power required is from two to four times that necessary to remove cast iron.

Recommendations

F. C. Spencer, in his report made of the first survey conducted in 1930 made a number of suggestions as to changes in design to make possible the most efficient use of the new tools. It is remarkable the extent to which many of these suggestions have been carried out. The writer offers the following further suggestions, in view of still further developments in the cutting tools:

1. Greatly increased power to permit taking heavy cuts at very high speeds up to the capacity of the cutting tool, with "utmost rigidity of the frame, driving shaft and spindle, tail stock or other members subject to strain" so that deflections shall be as small as possible.

2. Preloaded ball or roller bearings wherever needed. Built-in ball bearing live centers.

3. Built-in ammeters or preferably meters reading direct in horsepower, together with built-in tachometers showing spindle speed, so that the operator can tell at all times just what he is doing.

4. Automatic feed throw-out in case of overloading of the motor, to eliminate stopping the machine with tool in the cut and the feed on.

5. Automatic regulation of feed in accordance with power consumption, so that the lathe may operate at maximum capacity regardless of speed or depth of cut.

6. Separate motor drive for feed works.

7. Development of open-side or 4-way toolposts which can be adjusted for height to compensate for grinding the top of the tool, and permit correct setting with respect to the center line, without the use of shims or changing the cutting angle.

Precision Boring Gains Acceptance by Industry

Since 1928, when satisfactory equipment was first introduced, precision boring has been applied extensively to internal surface finishing. A. W. Schneider of the Heald Machine Company traced the rapid strides made in the adoption of the process before the A.S.M.E. in Cleveland on Sept. 11. This method of boring employs the well known toolroom practice of having a single-point cutting tool for generating a straight, round hole and using either a diamond or a cemented-carbide tool for high cutting speeds.

In developing the precision boring machine it was necessary to take several important factors into consideration. Vibration in the machine itself or in the spindle is objectionable, not only because of the chatter which is reproduced in the hole but also because of the widening use of the cemented-carbide tools which are susceptible to shock. Therefore, it was necessary to eliminate vibration to increase tool life. Boring spindles running up to 5,000 r.p.m. require a mounting which cannot have a runout of more than 0.0001 in. and a drive which does not introduce vibration. The relation of the table travel to the axis of the boring spindle must be accurately maintained and the moving member must have a smooth drive. Such machines are now available.

Close Limits

With tool material which allows cutting speeds of approximately 450 surface feet on cast iron and up to 1,500 surface feet on brass and aluminum alloys, with feeds of 0.002 to 0.007 in. per min., it is possible to duplicate and in most cases to improve the finish obtained by either reaming or broaching without increased labor cost. In addition this method will finish holes in relation to other holes or surfaces within limits not obtainable by other methods regardless of the condition of the previously roughed holes.

In automotive plants it is now generally accepted practice to finish such important holes as piston pin holes where size tolerance is usually maintained under 0.0003 in., where the hole is held perpendicular to the piston skirt within 0.0004 in. and where the opposing holes in the piston must be straight within 0.0001 to 0.0002 in. Bronze bushings in gears are bored true to the pitch lines of gears. Connecting rods have their opposite holes bored parallel and to close tolerances. The most recent development has been the boring of the cylinder blocks themselves. Several years ago automotive cylinders were ground to obtain the necessary roundness and straightness. This operation was so slow that reaming was substituted. The development of the precision boring machine now permits these blocks to be bored with not only a saving over the reaming method, but with the reduction of tolerance of size from 0.002 to 0.0005 in., of roundness from 0.001 to 0.0002 in., and of parallelism from 0.002 to 0.0002 in. in length of bore.

"Built-Up Edge" Affects Finish

Formation of the "built-up edge" preceding the nose of the cutting tool was discussed by Hans Ernst of Cincinnati Milling and Cincinnati Grinders, Inc., before the A.S.M.E. on Sept. 12. Mr. Ernst illustrated his talk with motion pictures taken through a microscope of a tool removing a chip. His study of the subject is printed in full in the August *Mechanical Engineering*. Following are the conclusions of Mr. Ernst and his co-worker M. Martellotti:

In every metal-removing process the cutting tool induces high stresses, and consequent large deformations, upon the material which will finally form what is generally known as a chip. In this process, a well-defined distribution of stress is produced, and a zone of highly worked material develops into a shape which is similar to that of a cutting tool. This is known as the built-up edge. The contour of this built-up edge is determined by various factors, the principal one being the distribution of stress produced by contact between tool and work.

In cases where there is no apparent discontinuity of flow, as in the so-called "flow" type of chip, the built-up edge adheres to the face of the tool, and by virtue of its location assumes the function of cutting, thus relegating the function of the tool to that of cutter support. Any discontinuity which may appear in the formation of the chip will affect the life of the built-up edge, but it will form again as soon as the discontinuity disappears.

The following factors act to decrease the magnitude of the built-up edge:

1. A decrease in chip thickness.
2. An increase in rake angle.
3. An increase in tool sharpness.
4. Application of lubricant to the tool face.
5. Increase in cutting speed.

In heavy roughing cuts the built-up edge provides a protection for the extreme edge of the cutting tool, thus distributing the chip load over a greater area. On the other hand the existence of a large built-up edge permits the frequent escape of portions thereof underneath the cutting edge, thus producing a considerable erosion of this surface.

With a large built-up edge, the finished surface of the work presents a rough and torn appearance. This is because the continuity of the work surface is broken at frequent intervals by fragments torn from the built-up edge. Hence for production of the highest possible quality of finish, all conditions should be such as to reduce the magnitude of the built-up edge as much as possible.

By analyzing the stress distribution produced by a tool on the work material and investigating further the process of plastic deformation and rupture, it will be possible to bring into the realm of accurate analysis and control elusive factors in cutting.

Grinding Process Brings Modern Conveniences

Howard Dunbar pointed out to the Machine Shop Practice Division, A.S.M.E. that the principal difference between the world of today and of yesterday is the increase in speed and degree of refinement which the mechanical devices of today provide. Mr. Dunbar is manager of the grinding machine division, The Norton Company.

To the modern grinding wheel and machine must go the credit for this advancement, and what does it mean to the public? Just this: comfort, luxury and beauty as outward qualities; and power, smoothness of operation and extreme safety as mechanical qualities. We have all these characteristics in beautiful cars that can be bought for a few hundred dollars. Had not this refining process taken place, we would have had still to count the automobile as an expensive and unreliable method of transportation.

Resistance Welding Aids Automotive Industry

Resistance welding in the automotive industry came to the front and commanded the attention of executives only about ten years ago, according to J. A. Weiger of P. R. Mallory & Co. Mr. Weiger spoke before the S.A.E. at Cleveland on Sept. 18.

A very noticeable trend has been toward the use of automatic machines. One of the most important advantages of automatic operation is the elimination of operator fatigue, thereby maintaining production at a high level with better satisfied operators, and in addition the results are more uniform welds, faster operation, better and smoother welds, lower current consumption and longer electrode life.

Types of resistance welding practiced in the automotive field are as follows: spot welding, flash butt welding, electrical upsetting, seam welding and projection welding.

Spot welding in the automotive industry is performed on machines ranging from approximately 10 kva. to many hundred kva., and ranging from one spot to several hundred during each cycle of the welder. Other methods for assembling of stampings are by either the parallel spot methods or the "Hydro-Matic" method. In the parallel spot method the machine contains one or more transformers. A number of electrodes are connected in parallel to each transformer and the pressure is made uniform throughout by spring adjustments. In the "Hydro-Matic" type welder a multiplicity of hydro-electric welding guns are mounted in pre-determined positions. The guns are connected to a common bus-bar a swell as to a common source of oil pressure. A highly efficient control mechanism automatically operates the welding guns in sequence in rapid succession.

Welding Body Parts

Flash welding is utilized for welding the rear and side panels of the body, wheel rims and a number of parts of the chassis, and has its special application where a smooth and invisible joint is required. After the flash-welding operation, the flash is removed by a trimming die and the parts are ready for assembly.

Practically all gasoline tanks are produced by electric resistance seam welding. Tanks are usually made from tern plate. The baffles are spot welded in position, after which the tank proper is seam welded. This operation is performed by passing the lapped joint between two rolls which operate at a lineal speed of 6 to 10 ft. per min., and regulated so that there is a series of spot welds, one over-lapping the other, resulting in a perfect seal.

One of the most essential parts of the resistance welding machine is the die or electrode material. For spot welding there are available today a number of alloys which have a life of three to twenty times that of copper. Correct pressure for spot welding cold-rolled steel is approximately 15,000 lb. per sq.in. of electrode area. Water cooling is very necessary on all types of spot welding tips.

For projection welding it is necessary to maintain parallel relations between the opposite faces of the dies. If the dies wear non-uniformly or if the projections produce cavities, non-uniform pressures and current densities will result. Flash welding requires a die material sufficiently hard to stand up under high pressure, and at the same time have the necessary properties so that the flash produced will not stick to the die material.

There is much room for still further improvement regarding resistance welding in the automotive industry. Machines will be made more automatic and will be radical departures from those in existance today. Ways and means will be found for doing what we now consider impossible.

Induction Heating Reduces Hardening Time

Heat-treatment and paint drying by induction heating are comparatively new developments, according to E. L. Bailey, electrical engineer, the Chrysler Corp. Before the Production Division of the S.A.E., Mr. Bailey said that the efficiency of the induction heating process is very high.

Continuing, he said that induction furnaces are divided into two classes: the cored type and the coreless type. The latter, which affords quicker heating time on hardening and paint drying operations than other processes, uses the hysteresis and eddy currents produced in the parts and obviously must use a fairly high frequency in order to produce sufficient heat.

In the processing of metals, most heat-treatments consist of: first, hardening, and then tempering, also termed drawing. For example, S.A.E. 1045 0.40-0.50 carbon steel draws at 800 to 1,300 F., depending on the strength and hardness desired. Here the induction heat gives nearly automatic temperature control. A part to be heated to 1,100 F., can be placed in a field of definite strength. Temperature rises very rapidly at first up to 850 to 900 F., and then much more slowly as the power input falls off with the loss of magnetic properties. The time usually given to a draw for a certain 1½-in. shaft by the "lead pot" method was 30 min. to insure complete change in the mass of metal. By induction heating, 8 min. was sufficient time to obtain the same results.

Paint drying is, perhaps, the latest practical process making use of induction heat. The idea of drying paint from the inside seems desirable to all of us, as the volatile matter next to the metal should be expelled before the outside layer seals over to trap these volatiles.

Standard oven practice determines the general form of an induction oven with the addition of a special structure for the coils, substituting aluminum rails for the conveyor through the inductor coils and the use of good thermal walls. These induction coils are wound close to the walls, floor and roof to form a simple solenoid through which the painted parts are carried on a single chain conveyor. The heat effect is planned so that the temperature of the parts is quickly raised to the required value. This rapid temperature rise does not wrinkle the paint.

Production efficiency of the induction oven is very high because all the electric energy of the high frequency circuit is used inside of the oven. The part being baked is always the hottest spot in the oven. A small amount of air is circulated through the oven and discharged carrying away the fumes of baking.

Rust-Proofing Methods Improve Quality

Rust will develop on perfectly clean steel but the corroding process is greatly accelerated on surfaces that are not chemically clean. Traces of pickling acids and their salts are always left on cold-rolled steel. These only need a little moisture to convert them into active rusters; and this moisture is always available because of the porosity of paint films. Even more active rusters are applied to the metal in the soldering fluxes used in metal finishing operations.

In view of these conditions a good deal of development work has been done on processes that counteract these rusters and inhibit further rusting while affording better paint adherence. The characteristics of the various processes were discussed before the Production Division of the S.A.E. on Sept. 18 by F. P. Spruance of the American Chemical Paint Company.

One process uses a phosphoric acid and oil-solvent mixture, to clean off rust, oil, and visible rusters, and also to destroy the invisible accelerators. Phosphoric acid in some types of treatment leaves a thin coating of phosphates on the metal. This further serves to increase the life and durability of the paint coating.

Crystalline Coating

While the above process has proved efficient for general body work, the rough treatment certain parts such as fenders, wire wheels, radiator grills and lamps are subjected to demands a more complete treatment. The second process is an example of treatment with activated phosphates. It uses a boiling solution of manganese dihydrogen phosphate, with a small percentage of copper phosphate added. A 3 to 7 min. dip deposits a crystalline coat of monohydrogen phosphate of iron and manganese, with traces of metallic copper. This deposited coat retards rusting and, by reason of its crystalline structure, makes a strong bond with the enamel primer. The etched surface produced in the process means that the effective or average thickness of enamel is greater than on a smoother surface, so that even though the coating has little rust resistance, it is an important rust preventer because it permits thicker paint films. When scratches break the enamel rust does does not develop far from the scratch.

A newer process to be offered to the automotive industry is a spray modification of the dip process in which a solution containing zinc phosphate is sprayed on the steel saving much time.

There is also a type of phosphate coating that has been developed recently that is extremely rust-resisting, and consequently lends itself readily to the shipment of parts unpainted. It is an electrolytic treatment in which the coating is developed from an electrolyte of zinc phosphate by an alternating current. A direct current would plate zinc on steel surfaces suspended in Granodine solution, but with the alternating current, the metal is coated, not with zinc, but with a continuous coating of zinc phosphate. The coating builds up on an area until the resultant resistance prevents the formation of additional deposit.

However, there are times when usage demands an even better coating. In this process the steel is first coated with a thin layer of zinc or cadmium in the regular plating method. Since paint will not adhere to these metals, they must be so treated that they will form a suitable lasting bond with the finish. The materials to be treated are immersed in a steel tank containing the coating bath. The coating is complete in from 30 to 60 sec., and then is rinsed and dried.

Transmission Gears Finished In Four Ways

Methods of finishing transmission gears were discussed by S. O. White and M. C. Hedgeland, of the Warner Gear Company before the S.A.E. on Sept. 18. They said that progress has been made in the production of more uniform steel, better forgings and in improved heat-treating methods, so that the distortion problem is greatly lessened. It has become evident that it is necessary to produce a highly accurate tooth in the green. With some shapes of gears that are favorable and with certain steels and heat-treating methods, it does not seem to be necessary to perform any finishing operation on the hardened teeth, if they are highly accurate and smooth in the green. In other cases, it is necessary to employ some lapping process on the hardened gear. The higher the quality of the green gear, the more satisfactory results obtain from lapping, in less time. It is no exaggeration to say that the gear finishing operations begin in the steel mill and are carried along in the forge plant.

In addition, it is important to have smooth teeth with a minimum of transverse cutter marks on the green gear. This is partially accomplished by various burnishing methods. Heat-treatment relieves the strains and the irregularities come back to a certain extent. Burnishing is still a valuable and effective process, but it can no longer be regarded as a cure-all or corrective for machining or cutting errors.

In view of the limitations of burnishing, several companies have worked on a process to remove a small amount of material, correct cutting errors by a generating cutter whose tool marks, if any, would be approximately in the direction of the tooth roll, wiping out any transverse cutter marks. One machine removes only about 0.005 to 0.010 in. of stock. The cutter is an involute rack, made up of individual teeth whose faces are serrated to provide cutting edges. This machine finishes gears that have been semi-finished by a hob.

Another way of doing the job is by use of a master gear with its tooth faces gashed, as a cutting tool, which, running at high speed, mates with and guides the gear being finished.

A third method combines burnishing and shaving. The hard burnishing gears have a spiral groove cut into the teeth which, when rolled against the soft work gear, has a cutting or shaving action.

The fourth method employs a machine which mounts two cutters. One cutter cuts on the push stroke, and the other on the pull. The first takes one side of the teeth on the work gear, while the second takes the other side. The cutters have a gap at one side to permit of loading the work and operating on a fixed center distance. There are the same number of teeth in the cutter, as in the work gear, so that one rotation completes the job.

Foreign Trade Summarized for Visitors From Abroad

At a dinner given by the National Machine Tool Builders Association, at the Union Club, Cleveland, Ohio, in honor of the overseas visitors to the Machine Tool Show, James G. Mooney, vice-president in charge of overseas operations, General Motors Corporation, and president of the American Manufacturers' Export Association, made a plea for removal of the barriers to foreign trade. He pointed out that the growth of economic nationalism, while less tangible than the threat of world war is quite as devastating to the economic security of everyone.

Economic nationalists, according to Mr. Mooney, have been content to push on in their blindness with the fallacy that a country can live on its own internal trade. In the United States there has been a continual barrage of statements to this effect in spite of the practical facts that this country has been an exporter of great volumes of certain commodities and manufactured goods for generations. These economic nationalists seem further blind to the fact that the worst slump ever known in foreign trade has coincided exactly with the burning and plowing under of farm crops and the plague of widespread industrial unemployment in the United States. It is certainly significant Mr. Mooney pointed out, that prosperity and employment have been at the highest level when foreign trade has likewise been at its highest level.

A foreign customer may speak a different language, but his order for goods is exactly like the order from the man across the street from the manufacturer's plant. Both of these are expected to pay for goods in dollars, and both of them must secure dollars to pay for goods by selling some of their own goods or services for dollars; but, when one of these customers, the foreigner, in his effort to pay you for your goods goes through exactly the same motions as your neighbor across the street, the foreigner's goods land at our national boundary and become imports.

Now the word "imports" has for years been a fighting word. We love exports, but we hate imports. Shrewd American business men, quick to agree that the basis of profitable business and full production is the ready exchange of goods, unfortunately "see red" when this subject is mentioned. The subject of imports brings up the question of tariffs, and no really red-blooded American can take a cool, business-like attitude toward the tariff. Most of the arguments on this subject, learned from our fathers and grandfathers, have become a bit stale because we are now living in a strange foreign trade world from the world that confronted them, notably on the following counts:

1. We have become a creditor nation, instead of a debtor nation.

2. The infant industries which our fathers and grandfathers were so eager to protect have grown up and are quite capable of challenging foreign industrial competition.

3. The countries abroad are all too concerned with their own stocks of gold, their own national credit, the stability of their own currency, which depends primarily on balances of foreign payment, and national budgets to permit us to ship goods to them unless we arrange definitely to take payment for such goods in their goods.

Mr. Mooney further told the machine-tool builders that their industry is certainly a self-reliant industry and that they have helped other industries to become self-reliant, too. They have helped the automobile industry to turn out a product that is supreme in value; genius shown for designing tools to speed up production, reduce cost and improve quality is the best answer anywhere to the calamity howlers who would worry us about the threat of foreign competition and throwing men out of work.

In concluding, Mr. Mooney stated that he was quite willing to risk the prophecy that the United States cannot solve its serious farm and commodity problems until such time as it helps the farmer reopen the overseas market for his surplus production. Foreign trade must be reconstructed to the end that these commodity surpluses will be marketed again abroad and to the further end that we shall take foreign goods and commodities in payment for them.

Tool Engineers Hear About Gage and Tool Developments

There was a large attendance at the annual dinner and meeting of the American Society of Tool Engineers at Cleveland on Sept. 13 with the president, R. M. Lippard, in the chair. Clayton R. Burt welcomed them on behalf of the Machine Tool Congress, stressing the spirit of hopefulness that pervaded those attending the Machine Tool Show and commending the tool engineers for their part in the advances shown by the machines exhibited.

A certificate of honorary membership was presented to John Younger for his work along tool engineering lines. Wm. H. Smila of the Chrysler Corp. told of the work being done by the society to make and publish standardized data sheets for all machine tools and such shop equipment as affects the tool engineer.

A. H. d'Arcambal of the Pratt & Whitney Co. discussed the latest developments in metal cutting tools and gages, based on his wide experience in these fields. High speed steels of the well-known 18-4-1 and similar types are now largely used while some special alloyed cast irons having 350 to 400 Brinell hardness might require even better tools, such as 18-4-2 or the newer molybdenum-tungsten alloys. Newer and better tools are reducing machining costs.

Stellite J-metal and the cemented carbides received attention. He pointed out the unfortunate methods used in the introduction of carbide tools which did not give them an opportunity to show their real value. They are finding many useful and economical applications. Better hardening equipment has transformed the heat-treating departments and insures such a uniformity of results as was never before possible. Nitriding of high speed tools and the use of chromium plating on both tools and gages have found numerous applications. Chrome plating is found to be more useful in the flutes of reamers than on the cutting edges, making it easier for chips to free themselves. Tap manufacture has been improved to such an extent that No. 4 fits can be obtained in nuts tapped by machines equipped with precision ground taps. There are, however, places where the cut tap proves very satisfactory.

Foreman in Front Line of Management

IN HIS opening remarks at the Cleveland Engineering Society meeting, Sept. 16, W. S. Knudsen, vice-president, General Motors Corporation, paid a tribute to the machine tool builders and their courage in improving their products during the depression years. Such progress as displayed at the Cleveland Public Auditorium could be obtained only by freedom of management to function and freedom of stockholders in their right of ownership. Management is the keynote of successful undertaking; it welds the facilities which capital provides into a profitable business. Its effectiveness will be lost if it is made a political football.

Industry recognizes various divisions of management such as are classed as the duties of the works manager, the sales manager, the chief engineer, the chief tool designer. But frequently it is guilty of failing to recognize the foreman as a part of management. The higher officials should regard the foreman's executive importance and make the foreman himself conscious of this recognition.

Mr. Knudsen continued, saying that up to about 1910 the foreman had complete control in his department. Industrial units were small; hiring, firing and responsibility for puality and getting out the product all were in the foreman's hands. With the World War came the demand for fast production and centralized control was introduced. Elaborate record keeping systems were installed until at times it seemed that the keeping of these records was more important than getting out the parts. Inspectors became responsible for quality and the foreman weighed down with the necessity of keeping records became a departmental statistician.

General Motors has definitely turned away from this condition and looks to the foreman to run his department. It is his function to apply the efforts of labor to the facilities of capital to obtain the most efficient result. He must have sole responsibility for quality and for meeting cost limits.

One of the foreman's important duties is to maintain harmony between the men and the company. With new ideas on collective bargaining coming to the fore the foreman can be of great value in removing potential sources of irritation by handling grievances on the spot. Plants having the best foreman control have also the least labor trouble.

Personnel departments are useful in maintaining a supply of labor and in keeping records of incompetents so they will not be rehired. But judgment of ability cannot be made at the gate; the foreman is the only one qualified to determine that. If the personnel department is not able to supply the quality of labor needed, the foreman should be encouraged to bring in the kind of labor he needs.

The foreman has been selected from the ranks because he has stood out from his fellows. His chief asset should be his executive ability. He must have enough knowledge of the work to take responsibility for methods and quality but his handling of men is his most important duty.

Only one person should give him orders on quality and quantity, on tooling and on safety work. Others may supply information and advice but the foreman should look to only one for direct orders. In the General Motors plants, putting the responsibility for safety into the foreman's hands has had excellent results. The reduction in severity and frequency has been pleasing. But the greatest consideration is the vast amount of human suffering which has been saved by the efforts of the foreman.

General Motors looks to its foremen for the instruction and training of employees. It looks to them for its new crop of superintendents, production and planning managers.

Many persons regard the foreman as being in between capital and labor. In the General Motors plants, this is not the case. As his title implies it is regarded as being out in front—the first line of management. His full authority should be established. His abilities should be used to the utmost. Plants that do this will have the least trouble in dealing with their men.

Mr. Knudsen was introduced by Joseph H. Gepfert, Cleveland Engineering Society.

Man's Dependence on Machinery Traced

At the second meeting of the Cleveland Engineering Society held on September 17, Guy Hubbard, consulting engineer, spoke in defense of mechanization. In this address Mr. Hubbard referred to the recent report of the National Industrial Conference Board, made for the National Machine Tool Builders Association, disclosing the direct employment that has come about through the development of eighteen new industries since 1879.

"From time to time" said Mr. Hubbard, "we hear someone criticizing the machine age, but never does one hear him specify the limits he would put on machines and new processes. It is fair to challenge anyone who questions the advantage of the machine age to ask him just where he would have discontinued the development of the machine. Would he have stopped it with the first few slow-moving steamships? Would he have checked it when the railroads first displaced the horses? Would he have hindered its use when the tractors first entered the fields, or at what later stage would he have stopped its progress? Would he have said that only the first few thousand wealthy people or Government officials should drive automobiles; that these same groups or similar ones should be supplied with electricity? At what point of relieving human drudgery would he cease and where would he draw the line against rapid and commodious modes of traveling available to all our people?"

"After all the public has the Machine Age in its complete control," said Mr. Hubbard in concluding, "If it wants the products of machines it will buy them. If it buys them the machines must be built and will be used. If they are built and used the Machine Age goes on. On the other hand, if the public wants to limit itself to things hand-made, that will be evidence that the Machine Age has not worked and it will cease."

"We all know that this will not happen. We know people do want what the machines produce in ever increasing quantities and at decreasing prices. It will continue to relieve the drudgery of the man who toils and the woman in the home. It will continue to raise the material standard of living and continue to give gainful employment."

PROGRAM

of the

NATIONAL METAL CONGRESS

CHICAGO, ILLINOIS

SEPTEMBER 30—OCTOBER 4, 1935

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American Society For Metals

MONDAY, SEPTEMBER 30

10:00 a. m.—Palmer House Ball Room

Metallography Session

ON THE PREPARATION OF IRON AND STEEL SPECIMENS FOR MICROSCOPIC INVESTIGATIONS, by F. F. LUCAS, Bell Telephone Laboratories, New York City.

OXALIC ACID AS AN ELECTROLYTIC ETCHING REAGENT FOR STAINLESS STEELS, by G. A. ELLINGER, National Bureau of Standards, Washington, D. C.

ON NAMING THE AGGREGATE CONSTITUENTS IN STEEL, by J. R. VILELLA, G. E. GUELLICH, U. S. Steel Corp., Kearny, N. J., and E. C. BAIN, U. S. Steel Corporation, New York City.

2:00 p. m.—International Amphitheatre

Research Session

ARC WELDING OF HIGH CARBON AND ALLOY STEELS, by T. N. ARMSTRONG, Norfolk Navy Yard, Portsmouth, Va.

A DILATOMETRIC STUDY OF THE ALPHA-GAMMA TRANSFORMATION IN HIGH PURITY IRON, by C. WELLS, R. A. ACKLEY and R. F. MEHL, Carnegie Institute of Technology, Pittsburgh.

SOME TRANSIENT PHASE CHANGES DURING THE GRAPHITIZING REACTION, by H. A. SCHWARTZ, H. H. JOHNSON, and C. H. JUNGE, National Malleable and Steel Casting Co., Cleveland.

4:30 p. m.—International Amphitheatre

Educational Lecture

HEAT TREATMENT OF STEEL, by Dr. M. A. GROSSMANN, Illinois Steel Co., Chicago.

7:30 p. m.—International Amphitheatre

Educational Lecture

SPECTROGRAPHIC ANALYSIS, by Dr. E. J. MARTIN, General Motors Corporation, Detroit.

TUESDAY, OCTOBER 1

10:00 a. m.—Palmer House Ball Room

High Temperature Session

HIGH TEMPERATURE PROPERTIES OF NICKEL-COBALT-IRON BASE AGE-HARDENING ALLOYS, by C. R. AUSTIN, Pennsylvania State College, State College, Pa.

GRAIN SIZE AND ITS INFLUENCE ON SURFACE DECARBURIZATION OF STEEL, by D. H. ROWLAND and CLAIR UPTHEGROVE, University of Michigan, Ann Arbor.

OBSERVATIONS ON THE OXIDATION OF STEEL, by M. BAEYERTZ, Illinois Steel Co., Chicago.

10:00 a. m.—Palmer House

General Session (Simultaneous)

CHROMIUM STEELS OF HIGH NITROGEN CONTENT, by RUSSELL FRANKS, Union Carbide & Carbon Research Laboratories, Niagara Falls, N. Y.

CORRELATION OF FAILURES FROM EMBRITTLEMENT OF 4 TO 6% CHROMIUM STEEL WITH THE NOTCHED BAR IMPACT TEST, by H. M. WILTEN, The Texas Co., Port Arthur, Texas.

FACTORS INFLUENCING THE NATURE OF THE CUTTING SPEED-TOOL LIFE CURVES, by O. W. BOSTON, W. W. GILBERT and C. E. KRAUS, University of Michigan, Ann Arbor.

2:00 p. m.—International Amphitheatre

High Temperature Session

PHYSICAL PROPERTIES OF METALS AS AFFECTED BY AMMONIA SYNTHESIS, by H. L. MAXWELL, E. I. duPont de Nemours & Co., Wilmington, Del.

INFLUENCE OF CARBON CONTENT ON THE HIGH TEMPERATURE PROPERTIES OF STEELS, by A. E. WHITE, C. L. CLARK, University of Michigan; and R. L. WILSON, Timken Steel & Tube Co., Canton, Ohio.

A NEW HEAT RESISTANT ALLOY, by S. L. HOYT and M. A. SCHEIL, A. O. Smith Corporation, Milwaukee, Wis.

4:30 p. m.—International Amphitheatre

Educational Lecture

HEAT TREATMENT OF STEEL, by DR. M. A. GROSSMANN, Illinois Steel Co., Chicago.

7:30 p. m.—International Amphitheatre

Educational Lecture

SPECTROGRAPHIC ANALYSIS, by DR. E. J. MARTIN, General Motors Corporation, Detroit.

WEDNESDAY, OCTOBER 2

10:00 a. m.—Palmer House Ball Room

Annual Meeting of the A.S.M.

EDWARD DE MILLE CAMPBELL MEMORIAL LECTURE, by H. W. MCQUAID, Republic Steel Corporation, Massillon, Ohio.

2:00 p. m.—International Amphitheatre

Grain Size Session

EFFECT OF CARBON, OXYGEN AND GRAIN SIZE ON THE MAGNETIC

PROPERTIES OF IRON-SILICON ALLOYS, by T. D. YENSEN, Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa., and N. A. ZIEGLER, West Penn Electric Co., Pittsburgh.

RELATION OF HOT WORKING TO THE McQUAID-EHN GRAIN SIZE, by H. A. GROVE, Republic Steel Corporation, Canton, Ohio.

AUSTENITIC GRAIN SIZE IN CAST IRON, by D. W. MURPHY and W. P. WOOD, University of Michigan, Ann Arbor.

4:30 p. m.—International Amphitheatre

Educational Lecture

HEAT TREATMENT OF STEEL, by Dr. M. A. GROSSMANN, Illinois Steel Co., Chicago.

7:30 p. m.—International Amphitheatre

Educational Lecture

SPECTROGRAPHIC ANALYSIS, by Dr. E. J. MARTIN, General Motors Corporation, Detroit.

THURSDAY, OCTOBER 3

10.00 a. m.—Palmer House Ball Room

Research Session

NOTES ON THE SOLIDUS TEMPERATURES IN THE SYSTEMS IRON-TUNGSTEN AND IRON-MOLYBDENUM, by W. P. SYKES, General Electric Co., Cleveland.

THE INFLUENCE OF DEOXIDATION ON THE AGING OF MILD STEELS, by B. N. DANILOFF, R. F. MEHL, Carnegie Institute of Technology, Pittsburgh; and C. H. HERTY, JR., Bethlehem Steel Co., Bethlehem, Pa.

THE AGING OF STEEL, by E. S. DAVENPORT, U. S. Steel Corporation, Kearny, N. J., and E. C. BAIN, U. S. Steel Corporation, New York City.

2.00 p. m.—International Amphitheatre

Research Session

ENDURANCE OF CASE HARDENED GEARS, by O. W. MCMULLAN, International Nickel Co., Bayonne, N. J.

PICKLE PITTING BY ELECTROLYTIC POTENTIALS AS AFFECTED BY SCALING TEMPERATURES, by C. H. MCCOLLAM and D. L. WARRICK, Timken Steel & Tube Co., Canton, Ohio.

DAMPING CAPACITY A FACTOR IN FATIGUE, by G. R. BROPHY, General Electric Co., Schenectady, N. Y.

4:30 p. m.—International Amphitheatre

Educational Lecture

HEAT TREATMENT OF STEEL, by Dr. M. A. GROSSMANN, Illinois Steel Co., Chicago.

7:00 p. m.—Palmer House Ball Room

Annual Banquet of the A.S.M.

FRIDAY, OCTOBER 4

10:00 a. m.—Palmer House Ball Room

HARDENING CHARACTERISTICS OF ONE PER CENT CARBON TOOL STEELS, by T. G. DIGGES and LOUIS JORDAN, National Bureau of Standards, Washington, D. C.

INTERPRETATION OF TORSION IMPACT PROPERTIES OF CARBON TOOL STEEL, by G. V. LUERSSEN and O. V. GREENE, Carpenter Steel Co., Reading, Pa.

CONTRIBUTORY EFFECTS OF FURNACE ATMOSPHERES ON THE GRAIN SIZE OF MOLYBDENUM HIGH SPEED STEEL, by ARTHUR PHILLIPS and M. J. WELDON, Yale University, New Haven, Conn.

2:00 p. m.—International Amphitheatre

Steel-Making Session

OPEN-HEARTH TEMPERATURE CONTROL, by EARNSHAW COOK, American Brake Shoe & Foundry Co., Chicago Heights, Ill.

THE EFFECT OF DEOXIDATION ON THE RATE OF FORMATION OF FERRITE IN COMMERCIAL STEELS, by D. L. MCBRIDE, Carnegie Institute of Technology, Pittsburgh; C. H. HERTY, JR., Bethlehem, Pa.; and R. F. MEHL, Carnegie Institute of Technology, Pittsburgh.

EQUILIBRIUM IN THE REACTION OF HYDROGEN WITH FERROUS OXIDE IN LIQUID IRON AT 1600 DEGREES CENT., by JOHN CHIPMAN, American Rolling Mill Co., Middletown, Ohio, and M. FONTANA, E. I. du Pont de Nemours & Co., Wilmington, Del.

4:30 p. m.—International Ampitheatre

Educational Lecture

HEAT TREATMENT OF STEEL, by Dr. M. A. GROSSMANN, Illinois Steel Co., Chicago.

American Institute of Mining Engineers Institute of Metals Division

TUESDAY, OCTOBER 1

9:00 a. m.—Palmer House, Registration

10:00 a. m.—Palmer House

Constitution Session

AN INVESTIGATION OF THE ZINC-RICH PORTION OF THE SYSTEM IRON-ZINC, by E. C. TRUESDALE, R. L. WILCOX and J. L. RODDA.

INFLUENCE OF LATTICE DISTORTION ON DIFFUSION IN METALS, by V. G. MOORADIAN and JOHN T. NORTON.

A STUDY OF THE MOLYBDENUM-CARBON SYSTEM, by W. P. SYKES, KENT R. VAN HORN and C. M. TUCKER.

2:00 p. m.—Palmer House

Reactions in Alloys

STUDIES OF PHASE CHANGES DURING AGING OF ZINC ALLOY DIE CASTINGS, II—CHANGES IN THE SOLID SOLUTION OF ALUMINUM IN ZINC AND THEIR RELATION TO DIMENSIONAL CHANGES, by M. L. FULLER and R. L. WILCOX.

QUENCHING STRESSES AND THE PRECIPITATION REACTION IN ALUMINUM-MAGNESIUM ALLOYS, by R. M. BRICK, ARTHUR PHILLIPS and A. J. SMITH.

NOTES ON THE CRYSTALLIZATION OF COPPER, by ALDEN B. GRENINGER.

WEDNESDAY, OCTOBER 2.

12:30 p. m.—Palmer House

Luncheon Meeting, Executive Committee, Institute of Metals Division

2:00 p. m.—International Amphitheatre

Gas-Metal Systems

REDUCTION OF CHROMIC OXIDE BY HYDROGEN, by F. C. KELLEY.

SOLUBILITY OF OXYGEN IN SOLID COBALT AND THE UPPER TRANSFORMATION POINT OF THE METAL, by A. U. SEYBOLT and C. H. MATHEWSON.

THERMAL AND ELECTRICAL CONDUCTIVITIES OF COPPER ALLOYS, by CYRIL STANLEY SMITH and EARL W. PALMER.

AN APPARATUS FOR DETERMINING CREEP IN SINGLE CRYSTALS, by R. F. MILLER.

6:30 p. m.—Palmer House

Dinner With Iron and Steel Division

METALLURGY IN NORWAY, by CARL W. VOLZ, Norwegian Smelting Works, Electric Furnace Products Co.

THURSDAY, OCTOBER 3

4:00 p. m.—Palmer House

Science Lecture

Joint Session With Iron and Steel Division

RECENT DEVELOPMENTS IN ISOTOPIC CHEMISTRY, by HAROLD CLAYTON UREY, Columbia University.

Iron and Steel Division

TUESDAY, OCTOBER 1

9:00 a. m.—Palmer House, Registration

10:00 a.m.—Palmer House

Blast Furnace and Raw Materials Session

PRODUCTION AND PREPARATION OF BLAST FURNACE FLUX, by PAUL C. HODGES.

BLAST FURNACE AIR-BLAST BENEFICATION, by THEODORE NAGEL.

SEPARATION OF HEMATITE BY MEANS OF HYSTERETIC REPULSION, by E. W. SCHILLING and HARWICK JOHNSON.

2.00 p. m.—Palmer House

Round Table on Qualities of Pig Iron

A General Discussion Without Formal Papers.

WEDNESDAY, OCTOBER 2

12:30 p. m.—Palmer House

Luncheon Meeting, Executive Committee, Iron and Steel Division

2:00 p. m.—International Amphitheatre

General Session

THE INITIAL STAGES OF THE MAGNETIC AND AUSTENITIC TRANSFORMATIONS IN A CARBON STEEL, by I. N. ZAVARINE.

NOTES OF THE ORIGIN AND GROWTH OF GRAPHITE NUCLEI IN SOLID AND LIQUID IRON SOLUTIONS, by H. A. SCHWARTZ and WOLFRAM RUFF.

6:30 p. m.—Palmer House

Dinner With Institute of Metals Division

METALLURGY IN NORWAY, by CARL W. VOLZ, Norwegian Smelting Works, Electric Furnace Products Co.

THURSDAY, OCTOBER 3

9:30 a. m.—Palmer House

Temperature Measurements of Liquid Iron and Steel

SOME METALLURGICAL APPLICATIONS OF THE FITTERER PYROMETER, by G. R. FITTERER.

TEMPERATURE MEASUREMENTS, WITH THE DISAPPEARING-FILAMENT OPTICAL PYROMETER, by W. E. FORSYTHE.

4:00 p. m.—Palmer House

Science Lecture

Joint Session With Institute of Metals Division

RECENT DEVELOPMENTS IN ISOTOPIC CHEMISTRY, by HAROLD CLAYTON UREY, Columbia University.

American Welding Society

MONDAY, SEPTEMBER 30

9:30 - 5:00 p. m.—Palmer House, Registration

1:45 p. m. Palmer House

Opening Session

Introduction of President of American Welding Society, by D. C. WRIGHT, chairman, Chicago Section.

Address of Welcome.

Presentation of Miller Memorial Medal Award.

2:30 p. m.—Palmer House

Technical Session

BRIDGE WELDING—A REVIEW OF THE LITERATURE, by F. H. FRANKLAND, vice-chairman, Committee to Study Welding of Highway and Railroad Bridges.

NITROGEN IN METTALLIC ARC WELD METAL, by J. W. MILLER, Reid Avery Co.

6:30 p. m.—Palmer House

Dinner Meeting, Board of Directors

TUESDAY, OCTOBER 1

9:45 a. m.—Palmer House

Fundamental Research in Welding

SPOT WELDING PROBLEMS, by J. H. ZIMMERMAN, Massachusetts Institute of Technology.

BEND TESTING OF WELDS—A SUMMARY, by M. F. SAYRE, Union College.

ADVANTAGES OF WELDING IN CONTINUOUS STRUCTURES, by INGE LYSE, Lehigh University.

2:00 p. m.—Palmer House

Fundamental Research in Welding

ARC WELDING WITH PURE IRON WELDS, by GILBERT E. DOAN, Lehigh University.

INVESTIGATIONS OF RESIDUAL STRESSES, by R. G. JAMIESON, McGill University.

LOW TEMPERATURE TESTS OF WELDS, by OTTO HENRY, Brooklyn Polytechnic Institute.

CREEP TESTS OF WELDS, by N. F. WARD, University of California.

7:30 p. m.—Palmer House

Conference

Conference and Meeting of Fundamental Research Committee, American Bureau of Welding.

WEDNESDAY, OCTOBER 2

9:45 a. m.—Palmer House

Technical Session

TESTS TO DETERMINE THE FEASIBILITY OF WELDING THE STEEL FRAMES OF BUILDINGS FOR COMPLETE CONTINUITY, by W. M. WILSON, University of Illinois.

WELDING ALL-METAL RADIO TUBES, by W. H. GIBB, Thomson Gibb Electric Welding Co.

A NEW GENERAL-PURPOSE METER FOR RESISTANCE WELDING, by C. STANSBURY, Cutler-Hammer, Inc.

2:00 p. m.—Palmer House

Symposium on Methods of Minimizing Distortion

1. PRESSURE VESSELS, by J. T. PHILLIPS, Foster Wheeler Co.
2. REPAIR WELDING, by GEO. HETTRICK, Anchor Welding Service, Inc.
3. LIGHT GAGE STEEL, by J. H. RLAHA, General Household Utilities Co.

MACHINE TORCH CUTTING AND FABRICATION OF TOOL EQUIPMENT, by G. DANLY, Danly Machine Specialties Co.

THURSDAY, OCTOBER 3

9:45 a. m.—Palmer House

Symposium on Low Alloy Steels for Welding Purposes

THE DEVELOPMENT AND USE OF LOW ALLOY HIGH TENSILE STEELS IN WELDED CONSTRUCTION, by A. E. GIBSON, The Wellman Engineering Co.

WELDING OF ALLOY STEELS, by H. L. MILLER, Republic Steel Corporation, J. C. HOLMBERG, Struthers-Wells-Titusville Corp., and CORBIN CHAPMAN, Hedges-Walsh-Weidner Co.

2:00 p. m.—Palmer House

Technical Session

WELDING OF ALLOY STEELS, by J. C. HODGE, Babcock & Wilcox Co.

EFFECT OF GENERATOR CHARACTERISTICS ON THE WELD, by J. H. BLANKENBUEHLER, Westinghouse Electric & Mfg. Co.

ELECTRICAL CHARACTERISTICS OF THE WELDING ARC, by S. C. OSBORNE, Wilson Welder & Metals Co., Inc.

7:30 p. m.—Palmer House

Annual Banquet

Wire Association

TUESDAY, OCTOBER 1

9:30 a. m.—Hotel Congress

Technical Session

ACID CLEANING AND MATERIAL HANDLING OF RODS AND WIRE, by FREDERICK A. WESTPHAL, Sheffield Steel Co., Kansas City, Mo.

MODERN ACID HANDLING METHODS LOWER PICKLING COSTS, by J. R. HOOVER, B. F. Goodrich Co., Akron, Ohio.

2:00 p. m.—Hotel Congress

Technical Session

HARD AND SOFT COPPER WIRE, by RUDOLPH A. SCHATZEL, General Cable Corporation, Rome, N. Y.

NOTES ON THE USE OF BACK PULL IN WIRE DRAWING, by Paul M. MUELLER, Revere Copper & Brass, Inc., New York City.

ELECTROLYTIC COPPER—Discussion.

WEDNESDAY, OCTOBER 2

9:30 a. m.—Hotel Congress

Grain Size Session

GRAIN SIZE AND ITS INFLUENCE ON THE MANUFACTURE OF STEEL WIRE, by B. L. MCCARTHY, Wickwire-Spencer Steel Co., Buffalo.

2:00 p. m.—Hotel Congress

Grain Size Session

THE EFFECT ON THE PHYSICAL PROPERTIES OF BENDING COPPER WIRE OF DIFFERENT GRAIN SIZES, by L. B. BARKER and C. A. BAILEY, General Electric Co., Schenectady, N. Y.

8:00 p. m.—Hotel Congress

Informal Dinner

INDUSTRIAL RELATIONS AS APPLIED TO THE WIRE INDUSTRY, by E. W. KEMPTON, American Steel & Wire Co., Cleveland.

Award of the Wire Association Medal.

THURSDAY, OCTOBER 3

9:30 a. m.—Hotel Congress

Technical Session

COLD HEADING WIRE, by LEROY D. SEYMOUR, Youngstown Sheet & Tube Co., Youngstown, Ohio.

TESTS AND TESTING, by C. A. KELLOGG, Continental Steel Corporation, Kokomo, Ind.

2:00 p. m.—Hotel Congress

Customer Relation Session

SAVE ON WIRE BY PROPER ORDERING, by KENNETH MURRAY, Republic Steel Corporation, Chicago.

CUSTOMER RELATIONS—Open Discussion

DIRECTORY OF EXHIBITORS

National Metal Exposition

International Amphitheatre — **Chicago, Illinois** — **September 30—October 4, 1935**

Air Reduction Sales Co., Booths E-23, E-19, F-20, F-16. Welding and cutting torches; weld testing machines; brazing and hard facing apparatus.

Ajax Electrothermic Corp., Booth A-4. Melting furnaces.

Allegheny Steel Co., Booth C-27. Stainless steels; sheets, bars, plates, tubing, wire, etc.

The American Brass Co., Booth B-2. Welding rods; copper, brass and bronze products.

Edgar Allen Steel Co., Booth L-41. High speed and tool steel.

American Car & Foundry Co., Booth A-31. Forging heaters; rivet heaters; valve stem heaters.

American Cyanamid & Chemical Corp., Booth G-12. Case hardening compounds.

American Gas Association, Booth H-21. Industrial gas equipment.

American Gas Furnace Co., Booth I-23. Heat treating, carburizing and nitriding furnaces; rotary retort carburizing machines; oven and pot furnaces; burners; high heat melters.

American Hard Rubber Co., Booth L-11. Hard rubber products.

American Machine & Foundry Co., Booth M-24. Machinery; cast parts.

American Manganese Steel Co., Booth O-27. Heat and corrosion resistant castings; manganese steel castings and welding rod; hard surfacing welding rod.

American Metal Market, Booth A-35. Publications.

American Rolling Mill Co., Booth O-23. Stainless and alloy steels.

American Sheet & Tin Plate Co., Booths D-15, D-19, D-23, E-16, E-20. Alloy and stainless steels; sheet steel.

American Steel & Wire Co., Booths D-15, D-19, D-23, E-16, E-20. Alloy steel; stainless and heat resisting steel; wire; strip; cold finished bars.

Armstrong-Blum Mfg. Co., Booths L-30 and K-29. Metal sawing machines, hacksaws; tapping machines.

Armstrong Cork Products Co., Booth L-11. Insulating materials.

Aurora Metal Co., Booth E-11 Die castings.

Babcock & Wilcox Co., Booth G-11. Refractories.

Baldwin-Southwark Corp., Booth L-19. Testing machines.

Barrett-Cravens Co., Booth N-42. Trucks; elevators; platforms.

Bastian Blessing Co., Booth K-34 Welding and cutting equipment.

Bausch & Lomb Optical Co., Booth A-27. Metallurgical microscopes; spectroscopes; accessories.

Bell & Gossett Co., Booth J-7 Case hardening compounds; heat treating supplies.

Bellis Heat Treating Co., Booth M-18. Heat treating furnaces and salts.

Bethlehem Steel Co., Booths C-15, D-16, C-19, D-20. Carbon and alloy steels; corrosion resisting steel; wire; bolts; small tool products.

G. S. Blakeslee & Co., Booth K-34. Metal washing and cleaning machines.

Bristol Co., Booth G-4. Pyrometers; temperature control equipment.

The Brown Instrument Co., Booths J-15 and J-19. Indicating and recording instruments; automatic control equipment.

Burdett Mfg. Co., Booth H-26. Gas burners and valves.

Andrew C. Campbell Div., American Chain Co., Booth F-9. Tools and dies.

Carboloy Company, Inc., Booth J-3. Cemented carbide tools.

Carborundum Co., Booth C-9. Abrasives; grinding and cutting wheels; refractory products.

Carnegie Steel Co., Booths D-15, D-19, D-23, E-16, E-20. Carbon and alloy steels; stainless and heat resisting steels.

Carpenter Steel Co., Booth C-20. Tool steels; stainless steels; torsion impact machine.

Case Hardening Service Co., Booth J-7. Case hardening compounds; heat treating materials and equipment.

Chapman Valve Mfg. Co., Booth A-32. Heat treating.

Chicago Eye Shield Co., Booth N-4. Goggles; eye shields, protective devices.

Chicago Steel Foundry Co., Booth K-28. Carbon and alloy steel castings.

Chicago Tool & Engineering Co., Booth L-23. Tools.

Climax Molybdenum Co., Booths L-42 and K-41. Molybdenum alloy steels and cast irons.

Colonial Broach Co., Booth I-3. Broaches.

Columbia Steel Co., Booths D-15, D-19, D-23, E-16, E-20. Carbon and alloy steels; steel shafts and bars.

Columbia Tool Steel Co., Booth I-3. High speed and tool steels.

Continental Industrial Engineers, Inc., Booth J-21. Furnaces and heat treating equipment.

Crown Rheostat & Supply Co., Booth M-19. Plating and polishing equipment; plating rheostats.

Crucible Steel Co. of America, Booth K-31. Tool steels; corrosion resistant steels; agricultural steels; drill steels.

Cyclops Steel Co., Booth O-19. Alloy and tool steels; plate; sheets; bars.

Darwin & Milner, Inc., Booth K-14. Tool steels.

Despatch Oven Co., Booth J-13. Gas heat treating furnaces.

Detroit Tap & Tool Co., Booth I-3. Tools and machinery.

Divine Brothers Co., Booth M-19. Buffing and polishing machines.

Joseph Dixon Crucible Co., Booth M-29. Graphite crucibles; stoppers; greases.

Dow Chemical Co., Booth B-35. Magnesium alloys; sand castings, die castings, forgings, structural shapes, bars, rods, sheet and plate.

Driver-Harris Co., Booth D-27. Heat and corrosion resisting alloys.

E. I. du Pont de Nemours & Co., Booth F-32. Heat treating salts; sodium, plating chemicals; metal cleaners

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Eclipse Fuel Engineering Co., Booth G-23. Heat treating furnaces; burners; mixers; valves; pressed steel pots.

Electric Furnace Co., Booth G-8. Heat treating, nitriding, forging, and brazing furnaces.

Electro-Alloys Co., Booth K-15. Heat and corrosion resisting alloys.

Electro Metallurgical Sales Corp., Booth I-1. Ferro-alloys; heat and corrosion resisting steels.

Ensign-Reynolds, Inc., Booth G-21. Soft metal melting furnaces; soldering furnaces; burners; gas compressors; air blowers.

Firth Sterling Steel Co., Booth L-7. Alloy steels; tool steels; stainless steels.

J. B. Ford Sales Co., Booth D-31. Metal cleaners and burnishing compounds.

Foxboro Co., Booth G-16. Indicating, recording and controlling instruments.

Gathmann Engineering Co., Booth C-23. Ingot molds.

General Alloys Co., Booth H-4. Heat and corrosion resisting alloys; furnace parts.

General Electric Co., Booth A-3. Electric furnaces; electric welding machines.

General Electric X-Ray Corp., Booth D-32. X-ray testing equipment.

William D. Gibson Co., Booth M-35. Springs.

Globar Corp., Booth C-9. High temperature heating elements.

Gogan Machine Co., Booth M-36. Hardness testing machines.

Claud S. Gordon Co., Booth I-10. X-ray films; pyrometers and accessories.

Grasselli Chemical Co., Inc., Booth E-35. Pickling inhibitors; fluxes; acids; chemicals for plating.

Great Lakes Steel Corp., Booth C-35. Sheet and strip steel; alloy steel.

Greenlee Foundry Co., Booth N-12-A. High test cast iron parts; Meehanite.

Grob Brothers, Booth N-41 Saws and filing machines.

Halcomb Steel Co., Booth K-31. Tool steels, corrosion resistant steels; agricultural steels; drill steels.

Hardinge Brothers, Booth L-31. Lathes; screw machines; milling machines.

Harnischfeger Corp., Booth D-42. Electric welding equipment and motors.

Hauck Manufacturing Co., Booth F-37. Oil and gas burners; regulating valves.

C. I. Hayes, Inc., Booth C-34. Electric heat treating furnaces.

Haynes-Stellite Co., Booth I-1. Cutting tools; welding rods.

Heat Treating & Forging, Booth K-12. Publications.

Hevi Duty Electric Co., Booth F-11. Miscellaneous electric heat treating equipment.

Hobart Brothers Co., Booth E-7. Electric arc welding equipment.

Hollup Corp., Booth K-3. Electric arc welders; electrodes and equipment.

Charles A. Hones, Inc., Booth J-22. Soft metal and soldering furnaces; oven furnaces; gas burners; tank heaters.

Hoskins Mfg. Co., Booth O-11. Heat resisting alloys; resistance wires; heating elements.

E. F. Houghton & Co., Booth D-9. Carburizing compounds; heat treating salts; industrial lubricants; cutting oils; leather belting and packings.

Illinois Steel Co., Booths D-15, D-19, D-23, E-16, E-20. Alloy steel; stain-

Booth Locations

National Metal Exposition

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New International Amphitheatre

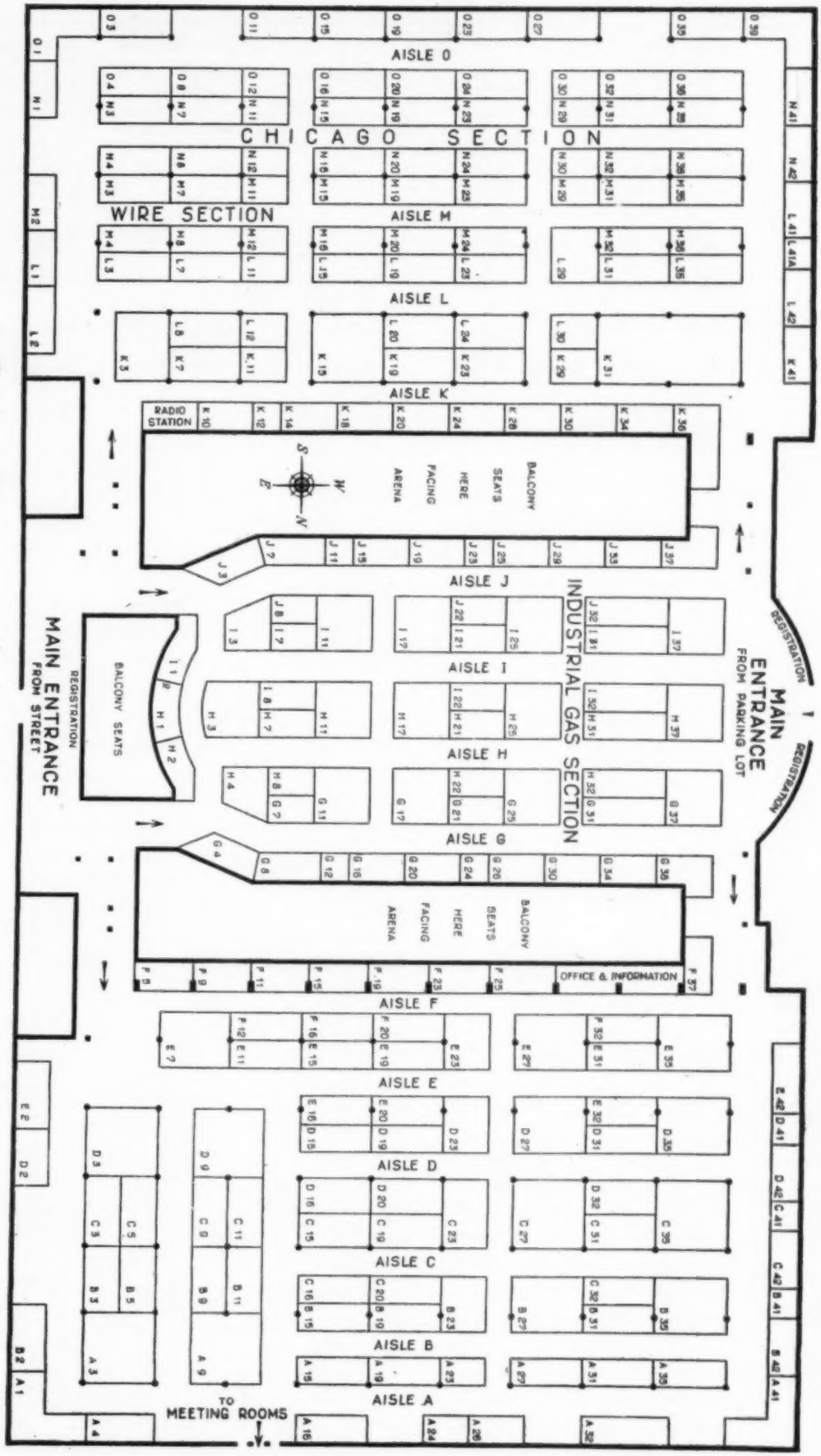
Chicago, Illinois

■

September 30

to

October 4



SEPTEMBER 25, 1935

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less and heat resisting steel; sheet; strip; wire.

Illinois Testing Laboratories, Inc., Booth J-11. Pyrometers; thermometers; thermocouples; meters.

Industrial Gas Engineering Co., Booth H-2-B.

Ingersoll Steel & Disc Co., Booth L-3. Stainless steels; clad metals.

International Nickel Co., Inc., Booths E-2 and D-2. Nickel and nickel alloys.

Iron Age, Booth F-23. Publications.

C. O. Jelliff Mfg. Corp., Booth M-33. Resistance wire; heat resisting alloys.

Jessop Steel Co., Booth N-11-A. Alloy steels; stainless steels; composite strip.

Johns-Manville Co., Booth L-12. Insulating materials; refractory cements; packings.

Jones & Laughlin Steel Corp., Booth D-11. Hot and cold rolled steel; screw stock; S.A.E. steels.

J. W. Kelley Co., Booth K-30. Heat treating products; industrial oils; drawing compounds.

Kelley-Koett Mfg. Co., Inc., Booth F-5. X-ray apparatus.

C. M. Kemp Mfg. Co., Booth J-31. Gas premixers; burners.

Kloster Steel Corp., Booth A-19. Tool steels; alloy steels; dies and tools.

James M. Kobabe Co., Booth G-28. Gas burners.

Leeds & Northrup Co., Booths E-42 and D-41. Heat treating furnaces; pyrometers and controlling instruments.

E. Leitz, Inc., Booth L-24. Microscopes; accessories and auxiliary devices for metal photomicrography.

Lincoln Electric Co., Booth H-3. Electric welding equipment; welding supplies.

Lindberg Engineering Co., Booths J-8 and I-7. Heat treating furnaces; pot furnaces; controls.

Lindberg Steel Treating Co., Booths I-7 and J-8. Heat treating equipment.

Linde Air Products Co., Booth I-1. Welding and cutting apparatus; welding gases.

Ludlum Steel Co., Booth C-42. Tool steels; stainless steels; nitralloy.

Lufkin Rule Co., Booth M-37. Precision tools; micrometers; gages; measuring tapes; rules.

Lydon Brothers, Booth G-22. Heat treating furnaces.

Machinery, Booth A-23. Publications.

Macklin Co., Booth E-15. Grinding wheels; cut-off machines.

Magnaflux Corp., Booth F-19. Inspection method and equipment.

Magnetic Analysis Corp., Booth B-41. Magnetic analysis equipment.

Mahr Mfg. Co., Booth M-11. Oil and gas furnaces; burners.

Manhattan Rubber Mfg. Co., Booth F-7. Grinding wheels; cut-off machines.

Marburg Brothers, Inc., Booth F-30. Cutting tools; gages; pneumatic hammers.

Charles A. Martin Co., Booth G-20. Valves and controls.

Metal & Thermit Corp., Booth D-30. Welding electrodes and equipment.

Metal Forming Corp., Booth N-8-A. Hollow moldings; welded, lock and butted joint tubing.

Metallizing Co. of America, Booth N-1. Metal spraying equipment.

Metals & Alloys, Booth M-32. Publications.

Lee B. Mettler Co., Booth G-28. Gas burners.

Michiana Products Corp., Booth H-7. Heat and corrosion resistant alloy castings; oil filters.

Michigan Steel Casting Co., Booth K-36. Heat and corrosion resisting castings.

Michigan Tool Co., Booth I-3. Cutting tools, hobs; tungsten carbide tools.

A. Milne & Co., Booth L-41. Tool steels; drill steel; special sections; cutlery sheets.

Minneapolis-Honeywell Regulator Co., Booth J-15. Automatic control systems; indicating and recording instruments.

Molybdenum Corp. of America, Booth F-25. Molybdenum steels and alloys.

Monarch Engineering & Mfg. Co., Booth I-21. Furnaces.

National Cylinder Gas Co., Booth L-15. Oxygen; acetylene; cutting and welding machines; welding rods; testing machines.

National Industrial Publishing Co., Booth E-19-A. Publications.

National Tube Co., Booths D-15, D-19, D-23, E-16, E-20. Tubing.

New Jersey Zinc Co., Booths B-23 and C-20. Zinc alloys; die castings.

North American Mfg. Co., Booth M-34. Gas and oil combustion equipment.

Norton Co., Booth A-41. Grinding wheels and abrasive products.

Oakite Products, Inc., Booth H-10. Cleaning compounds.

Oil Well Supply Co., Booths D-15, D-19, D-23, E-16, E-20. Alloy steels; stainless and heat resisting steels.

Tinius Olsen Testing Machine Co., Booth A-15. Testing machines and other instruments.

Page Steel & Wire Division, American Chain Co., Inc., Booth E-32. Welding wire.

Park Chemical Co., Booth G-32. Case hardening compounds.

Parker-Kalon Corp., Booth K-7. Screws and fastening devices; bolts and nuts.

Partlow Corp., Booth I-24. Temperature controls; thermometers.

Pennsylvania Salt Mfg. Co., Booth K-10. Industrial salts and chemicals.

Perfection Tool & Metal Heat Treating Co., Booth N-4-A. Heat treating.

Plibrico Jointless Firebrick Co., Booth I-8. Refractories.

Radon Co., Inc., Booth B-19. Radium radiographic equipment.

Republic Steel Corp., Booth D-3. Alloy steels; stainless and heat resisting steels; tubing; bolts and nuts; architectural sections.

Rex Products & Mfg. Co., Booth K-11. Metal cleaners.

Rich Mfg. Co., Inc., Booth O-3. Electric arc saws.

Rodman Chemical Co., Booth N-19. Carburizing compounds; quenching oil.

John A. Roebling's Sons Co., Booth B-42. Wire and wire rope; cables; woven wire fabrics.

Ruud Mfg. Co., Booth H-23. Water heaters; boilers.

Joseph T. Ryerson & Son, Inc., Booth F-12. Alloy and tool steels; stainless and heat resisting steels; bearing metal; cold rolled steel; plate; welding rods.

Scully Steel Products Co., Booths D-15, D-19, D-23, E-16, E-20. Structural shapes; bars; plates; tubes.

Selas Co., Booth G-34. Gas premixers; burners; soldering systems.

Sellstrom Mfg. Co., Booth N-4-B. Goggles; eye shields; welding helmets.

Seymour Mfg. Co., Booth M-19. Nickel silver; phosphor bronze.

Shore Instrument & Mfg. Co., Booth M-31. Hardness testing instruments.

Sivyer Steel Casting Co., Booth J-10. Steel castings; heat resisting castings.

South Bend Lathe Works, Booth O-15. Lathes.

Spencer Turbine Co., Booth H-11. Air compressors; vacuum cleaners.

Star Electric Motor Co., Booth M-16. Electric motors, dynamos, generators.

Steel, Booth E-34. Publications.

Steel & Tubes, Inc., Booth D-3. Tubing.

Steel City Testing Laboratory, Booth L-8. Testing machines.

Steel Publications, Inc., Booth K-12. Publications.

Charles G. Stevens Co., Booth M-8. Wire; strip steel; cold drawn shapes; non-ferrous shapes; hot rolled steel; crucible tool steel.

N. A. Strand & Co., Booth K-24. Flexible shaft machines and attachments.

D. A. Stuart & Co., Booth A-4. Lubricants and cutting oils; lubricant testing machines.

Surface Combustion Corp., Booth H-37. Heat treating furnaces; burners; accessories.

Sutton Engineering Co., Booth L-29. Straightening machinery.

C. J. Tagliabue Mfg. Co., Booth I-11. Indicating, recording and controlling pyrometers.

Tennessee Coal, Iron & Railroad Co., Booths D-15, D-19, D-23, E-16, E-20. Alloy steels; bars and shapes.

Thermo Control Devices, Inc., Booth L-1. Pyrometers and control instruments; auxiliary equipment.

Thomas Steel Co., Booth E-19. Cold rolled strip steel.

Timken Steel & Tube Co., Booth A-9. Alloy steels.

Titanium Alloy Mfg. Co., Booth D-35. Titanium alloys and compounds; iron and steel castings; sheet and tin plate; ceramics and industrial chemicals.

Udylite Co., Booth A-1. Plating equipment.

Una Welding, Inc., Booth B-31. Arc welding machines.

Union Carbide Co., Booth I-1. Welding and cutting apparatus; ferro-alloys; carbon products; oxygen and acetylene.

United States Steel Corp., Booths D-15, D-19, D-23, E-16, E-20. Carbon and alloy steels; stainless steels; high tensile steels; wire; strip; bars; tubes; sheets; springs.

Universal Steel Co., Booth O-19. Steel plate; sheets; bars.

Vanadium Alloys Steel Co., Booth B-27. Vanadium steel; tool steels.

Vanadium Corp. of America, Booth A-16. Vanadium alloys and compounds.

Vapofier Corp., Booth L-23-A. Oil burners.

Victor Saw Works, Inc., Booth L-41-A. Hack saw blades; hack saw machines.

Vulcan Crucible Steel Co., Booth M-23. Forgings; tools; special steels.

Waterbury Farrel Foundry & Machine Co., Booth M-20. Wire drawing machinery.

Welding Engineer Publishing Co., Booth K-19. Publications.

Wesley Steel Treating Co., Booth K-18. Heat treating.

Western Foundry Co., Booth M-24-A. Aluminum castings; semi-steel castings.

Westinghouse Electric & Mfg. Co., Booth C-16. Electric heat treating furnaces; electric welding equipment.

Wheelock, Lovejoy & Co., Inc., Booth E-27. Alloy steels; tools steels; machinery steels.

Wickwire Spencer Steel Co., Booth C-31. Wire and wire products.

Wilkens-Anderson Co., Booth M-2. Microscopes; metallographic equipment.

Youngstown Sheet & Tube Co., Booth A-24. Alloy steels; structural shapes; sheet; bars.

Ziv Steel & Wire Co., Booth K-14. Tool steel; wire.

EDITORIALS

VOLUME 79 AMERICAN MACHINIST ESTABLISHED 1877 NUMBER 20
McGRAW-HILL PUBLISHING COMPANY, INC.

K. H. CONDIT • F. H. COLVIN
EDITORS

"UNCONSTITUTIONAL"

THE Wagner-Connery labor relations act "constitutes a complete departure from our constitutional and traditional theories of government."

In that statement is summed the considered opinion of fifty-eight of the nation's leading lawyers, acting under the sponsorship of the American Liberty League. New Dealers squirm and ridicule these findings. But against their derision stands the professional and personal integrity of such men as former Attorney General George W. Wickersham; James M. Beck, former solicitor general of the United States; former Secretary of State Bainbridge Colby; and John W. Davis, former Democratic presidential nominee, to mention a few of a list of illustrious names.

Claims for violation of the Constitution are based on infringements of the rights of employees, employers and the States. Under the Constitution, every man is conceded the right to sell his own labor under his own terms. But, under this act, a competent man may be forced to accept terms determined by more numerous but less capable employees.

Likewise the employer is deprived of the right to negotiate with minority groups or individual employees. He may deal only with representatives certified by the Labor Relations Board whose determination of factual matters is final and conclusive. Trial by jury and the customary safeguards of judicial rules of evidence are discarded. The act makes no provision for regulating the activities of unions or for fixing responsibility on their part.

The committee finds further that the relation between employer and employee has no direct connection with commerce; that production is not commerce. Therefore, the act concerns relations subject to powers reserved by the Constitution to the several states.

The Supreme Court of the United States is the only body that can finally rule upon the constitutionality of this inequitable labor law. The Liberty League committee can only voice the unanimous opinion of its members. But its forthright statement points out the basis upon which much of the anti-business legislation, forced upon a tired Congress, may be found invalid.

Two Shows

LAST Saturday the Machine Tool Show closed. On Monday the National Metal Exposition will open.

One display reflected the remarkable progress made by makers of metal-working machinery; the other will afford an opportunity to view the achievements of manufacturers of materials and welding and heat-treating equipment. Both are striking tributes to the courage of American industrialists during a period of adversity and to their confidence that this country is now emerging from the depths of the worst economic depression in its history.

Those of us who visited the Machine Tool Show at Cleveland were amazed by the ingenuity revealed in the products displayed there. We knew that, while we had witnessed the inauguration of a new epoch in metal-working, we could not hope to form an immediate appraisal of its full import to industry.

We turn next week to Chicago, well knowing that those who develop materials and metallurgical processes will keep step with the bold strides set by their brothers who build machines.

Thirty Per Cent

LAW makers in Ohio have, probably unconsciously, added a forcible argument to economy of replacing old shop equipment. For, no matter how old it may be or how long it has been charged off the books, it is now taxable at 30 per cent of its original value. In other words no more than 70 per cent can be depreciated as long as the machine remains part of the usable equipment of the plant.

As a result of this new law wide awake shop managers are insisting on new equipment. Better have new machines that can produce more and better work than to pay taxes on 30 per cent valuation of machines that have been loafing on the job too long in any case.

This seems to be a very fair law. It assumes that a machine that is used has at least 30 per cent value or it would not be kept in use. It also compensates to some extent for the inequality in machine overhead to be charged on competitive jobs. Without this minimum valuation, shops with antiquated equipment that had been charged off the books years ago feel justified in charging a very low overhead. True the shop with new machines can produce work at lower machining cost. But with all the opportunity old equipment gives for juggling overhead figures, the 30 per cent minimum seems to have its advantages.

Chips

Washington—Roosevelt promises business a breathing spell in a staged exchange of letters with publisher Roy Howard . . . says major objectives of New Deal have been attained . . . stock market and general business advance—because of the President's promise, if you feel that way, in spite of it, if you don't . . . assassination of Senator Long removes a thorn from the side of the New Deal . . . succession in doubt . . . Brookings report on AAA finds its effectiveness slight . . . Government agrees to have TVA reviewed by Supreme Court to test its legality . . . veterans of Foreign Wars promise to renew bonus fight.

Foreign—Great Britain warns Mussolini to watch his step . . . France thinks over the situation and decides to side with her cross-channel neighbor . . . Soviet drop their deriding of capitalistic blunders and plop on the same side . . . Ethiopia jumps to such arms as are available and plans a desperate guerrilla resistance . . . Mussolini sounds his battle cary and goes on his way regardless . . . Nazis get another apology from Hull, this time because of Magistrate Brodsky's blast at trial of men who tore down Nazi ensign on "Bremen" . . . Reichstag votes itself voiceless amid loud cheers . . . Financial leaders worry over effects of latest party conclave at Nuremberg . . . Latest rules against Jews puts them back to their status in the Middle Ages . . . But to make matters completely incomprehensible to outsiders Hitler orders violence against Jews to cease and urges resumption of trading with Jewish shops.

Finance—Federal exchange financing slowing down a bit . . . silver purchases satisfy nobody and particularly not the silver senators . . . Morgan firm splits to form a security house . . . Auctions holdings of Van Schweringen collateral . . . Loree rumored as backer of Vans . . . Securities Commission Head Joseph P. Kennedy resigns.

Industry—Machine Tool Show, an outstanding example of courage and initiative on the part of machine tool builders, draws a crowd of buyers ready to meet the offering halfway . . . Automobile production continues high despite approaching show . . . New Orleans dock strike called off . . . Trouble brewing in soft coal fields as no board to administer Guffey Bill is appointed . . . Troops called out again in Minneapolis to settle strike . . . steel mills believed to be getting some shell orders . . . Brass mills of Connecticut busier than they have been for years.

Indicators—Business Week's index falls slightly to 66.7 . . . Power output rises to 11.9 per cent over same week in 1934 . . . Steel operations decline as auto makers prepare for new models.

Business Launches Attack on Validity of New Deal Statutes

WASHINGTON—If the "breathing spell" promise were promulgated as a potent anaesthetic for tired business men it certainly missed its mark. Instead of being lulled to sleep by the prospect of a brief respite from hostile legislation, defenders of freedom in private enterprise were stimulated in their search for ways to stem a new flood of restrictive measures with the next convening of Congress. Not content merely to prepare for a future encounter against forthcoming New Dealings, they are making their attack retroactive by moves to prove the invalidity of much of the program already passed.

Court tests have been inaugurated involving the Guffey coal act and the public utilities act. The American Liberty League's legal committee of 58 initiated its survey of recent legislation by opining that the Wagner Labor Act is unconstitutional. J. C. Gall, counsel for the National Manufacturers Association, added to the list of laws classed as counter to American tradition the agricultural adjustment act and the social security act.

If these organizations are correct in their contentions the New Deal social philosophy will be considerably deflated. The course of the Administration's counter attack is indicated in Secretary Roper's Constitution Day address at Alexandria, Va. As the conservative member of the New Deal family, the Secretary apparently was selected to launch a trial balloon to sound out political repercussions to open advocacy of an amendment looking toward freeing the federal government from its constitutional fetters.

First round in the fight went to the administration when John Dickinson, newly acquired by the Department of Justice, successfully contended that the request for an injunction against the Guffey act was premature. More of a stall than a victory, the ruling merely deferred the day when this and other controversial statutes will be dumped into the judicial hopper that eventually will decide whether they are laws or laboratory experiments.

Lady Luck again blessed President Roosevelt's political career in the untimely demise of the administration's foremost opponent within its own ranks. Demagogue though he was, Senator Huey Long performed a public service by holding up to public view some of the devious ways in which political patronage is employed to perpetuate the party in power.

Table I—Index of Orders Based on Volume of Shipments for 1926

Month	Index of Orders: Domestic	Foreign	Total	3 Months' Average Index	% Foreign to Total Orders
1935—February	41.2	10.9	53.0	61.5	20
March	48.5	13.8	62.3	60.3	21
April	54.5	11.2	65.6	60.3	17
May	57.3	16.0	73.3	67.1	21
June	75.5	15.6	91.1	76.7	17
July	82.5	37.3	119.8	94.7	31
August	78.2	47.6	125.8	112.2	37

Table II—Index of Orders—By Size of Companies

Month	Index of Orders: Domestic	Foreign	Total	No. of Reports	% Foreign to Total Orders
Group A—Companies reporting year's sales in 1926 of $200,000 or more:					
1935—February	42.1	11.4	53.5	98	21
March	48.0	14.4	62.4	94	23
April	54.8	11.8	66.6	94	18
May	57.3	16.7	74.0	83	23
June	76.0	16.0	92.0	88	17
July	80.3	38.8	119.1	87	33
August	77.2	49.3	126.5	85	39
Group B—Companies reporting year's sales in 1926 of less than $200,000:					
1935—February	42.1	4.5	46.6	81	10
March	55.7	5.5	61.2	78	9
April	48.0	3.8	51.8	75	7
May	57.3	3.2	60.5	55	5
June	68.1	10.9	79.0	69	14
July	117.6	13.8	131.4	62	10
August	95.4	19.1	114.5	58	17

Table III—Distribution of Orders

(Shown by indexes of individual companies)

New Orders in % of 1926 Shipments	Number of Reports in Each Index Group: Feb.	Mar.	April	May	June	July	August
200 or more	6	6	7	6	14	31	22
100–199	19	25	21	21	31	35	33
90–99	5	8	3	8	8	5	3
80–89	3	5	9	3	8	7	6
70–79	10	9	13	11	10	8	5
60–69	8	7	13	6	10	8	10
50–59	18	15	13	8	5	14	10
40–49	18	21	16	9	7	9	12
30–39	21	21	14	11	15	7	8
20–29	23	13	17	15	15	9	10
10–19	18	23	18	11	14	6	9
Less than 10	30	19	25	29	20	10	16
Total Reports	179	172	169	138	157	149	144

Machine Tool Index Jumps Six Points

Foreign orders pushed the index of the National Machine Tool Builders' Association up another six points in August. This business from overseas combined with domestic orders nearly equal to July gave the industry another "best month" since 1929. The 15-year average of index of 76.2 was exceeded in June by 20 per cent, in July by 57 per cent and in August by 65 per cent.

The average index for the year to date is 82.5, almost double the average for 1934. For the first eight months of 1935 the total business reported is 18 per cent above that for the whole of 1934.

Very little effect on domestic orders because of the Show is seen in the slight drop of 5 per cent from the preceding month. Of the month's new business 37 per cent was accounted for by overseas orders and both large and small companies shared in them.

Domestic business of the smaller companies is relatively better than that of the larger ones. Through June of this year there was no marked difference between the indexes for the two groups. But in July the smaller companies forged ahead so rapidly that their index jumped to 117.6. Since then it has dropped back to 95.4, but is still much closer to the 1926 base taken as normal than the index for the larger companies which now stands at 77.

Much of the foreign business (Amtorg particularly) has gone to the larger companies. The result is an index for foreign orders, as reported by Group A, Table II, of almost 50 per cent of normal. This compares with 20 per cent of normal for Group B. Particularly large commitments from abroad in August put the total index for Group A at 126.5, an even twelve points ahead of the total index for the smaller companies.

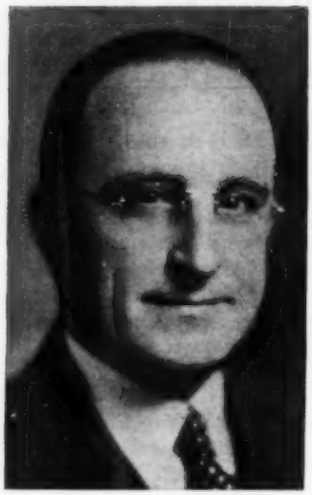
S.A.E. Presidential Nominee

RALPH R. TEETOR

Production Engineering Head

KARL L. HERRMAN

Heads Dealers



N. A. BOOZ

S.A.E. Nominations for 1936 Announced at Cleveland Meeting

During the national production meeting of the S.A.E. in Cleveland, Sept. 19, the list of nominations for officers of the society for 1936 was announced. Ralph R. Teetor, nominated for president, is vice-president in charge of engineering, the Perfect Circle Co., and is chairman of the society's Research Committee. He also served on the council in 1930 and 1931.

Other nominations for officers and councilors included the following:

For treasurer, David Beecroft, manager, New York office, Bendix Aviation Corp.

For vice-presidents: representing aircraft engineering, Mac Short, vice-president and chief engineer, Stearman Aircraft Co.; representing aircraft-engine engineering, Opie Chenoweth, research engineer, U. S. Army Air Corps, Wright Field; representing diesel-engine engineering, Fred M. Young, president, Young Radiator Co.: representing fuels and lubricants engineering, T. B. Rendel, in charge of automotive research laboratory, Shell Petroleum Corp.; representing passenger-car engineering, Earl H. Smith, development engineer, Packard Motor Car Co.; representing passenger-car-body engineering, Ronald J. Waterbury, body engineer, Chevrolet Motor Co.; representing production engineering, Karl L. Herrmann, vice-pres., Bantam Hall Bearing Co.; representing transportation and maintenance engineering, Harley W. Drake, superintendent of garage, Portland Gas & Coke Co.; representing truck, bus and railcar engineering, Adolf Gelpke, assistant chief engineer, Autocar Co.;

For councilors to serve in 1936-1937, Joseph A. Anglada, president Anglada Motor Corp.; Louis Schwitzer, president, Schwitzer-Cummins Co.; and Alex. Taub, development engineer, Chevrolet Motor Co. Members of the 1936 Council will include also F. C. Horner, assistant to vice-president, General Motors Corp.; H. T. Woolson, chief engineer, Chrysler Corp.; and Austin M. Wolf, consulting engineer, New York, who were elected to serve at the beginning of 1935 for a two-year term; and as past-presidents, D. G. Roos and William B. Stout.

Norton A. Booz Heads Machine Tool Dealers

Exceeding the record attendance of the last meeting by a comfortable margin, the annual meeting of the Associated Machine Tool Dealers at the Hotel Cleveland, September 9, discussed ways and means of improving sales. Aside from the Machine Tool Show itself, which everyone expects to be extremely effective in stimulating business, such outside factors as the availability of FHA insured loans for modernization were argued on the floor.

Three addresses were on the program: reminiscences by August H. Tuechter, who has distributed his product through dealers for 50 years; an account of the aims and history of the Dealers Page in *Iron Age*, by L. M. Waite of the *Iron Age* staff; latest developments in the modernization campaign, by K. H. Condit, editor, *American Machinist*.

Norton A. Booz, Federal Machinery Sales Co., Chicago, was elected president to succeed W. F. McCarthy, Henry Prentiss & Co. Harry Barney of Pittsburgh, secretary during the last three administrations, was elected vice-president, and John Sauer, Peninsular Machinery Co., Detroit, was made the new secretary. New directors are Albert M. Stedfast, Boston; George Zimmerman, Cleveland; Percy Ridings, Syracuse.

Mr. Tuechter spoke interestingly of the days when one man called another a horse thief if that's what he thought he was, and not one of the euphemistic parallels that would be used today. Coming down to present-day needs he pointed out that the dealer has certain definite advantages as a distributor of machine tools; that he is in an excellent position to watch developing trends.

Annual Safety Congress Will Hear Many Speakers

Seven thousand delegates from the United States and foreign countries are expected for the 24th annual congress and exposition at Louisville, Ky., Oct. 14-18 under the auspices of the National Safety Council. During the 120 sessions devoted to safety in various fields more than 360 speakers will be heard. The exposition will feature a huge display of equipment developed in recent years for safeguarding operations of all kinds.

Model Changeover in November Aids Auto Parts Suppliers

DETROIT — Parts suppliers are now busily producing and shipping '36 products to the assembly plants. While these concerns are not entirely set up for production of the new parts, their difficulties are not so great under the earlier introduction date of Nov. 2 as prevailed with the January show. Many conveyors and much auxiliary equipment must still be set up, but four or five months remain in which to iron out difficulties and to train workers before peak output will be required. Greater efficiency and lower costs will result.

Under the former plan of new model introduction the rush period for suppliers began in January and February. It was the general condition that employees had less than 60 days' experience on the new parts before maximum output was required in March and April. With many troublesome bugs still plaguing production men, plus inexperienced help, excessive costs and spoilage were the inevitable result.

Tool Shops Less Busy

Because of the general advancement in schedules, the rush in small tool and gage work reached a peak last month and has tapered off since. Passenger car dies were pushed through earlier and very little such work remains. Now the main source of business for the independent shops is the changes being made in commercial cars. This, with the die work for the Russian car referred to in an earlier number, is expected to keep the larger shops busy until the middle of November. Then to follow will be the number of changes that are always made after unveiling time to regain competitive position.

Interest in new machinery is at its height with the Cleveland Machine Tool Show in session. No spectacular programs are in sight in this area, but buying is on a sustained level and widely distributed. Supplier industries and small plants are participating. '36 contracts are reported placed on a very close basis, frequently being under the '35 figures. This condition forces the purchase of heat-treating equipment, a welder, a new machine, or a conveyor, or all or many of them, for use in innumerable points in many plants in order to secure business or to provide for changes in design. Changes in wheels alone for new model cars will run in the neighborhood of a half-million investment for new equipment.

Plenty of inquiries for used machinery are reported but machines to supply the demand are hard to get. Recent sales of new machines have not greatly relieved the situation since these in general have been replacement of machines which are special in some particular. Discontinuance of the Packard service department through provision for servicing in the regular line has released over 100 used machines during the past week.

The latest expansions anounced in the industry include the acquiring of a Los Angeles factory by Studebaker for conversion into an assembly plant to serve the West Coast. The A.C. Spark Plug Company of Flint completed during the first week of September a revision of the layout, including new equipment for many of the instruments produced by this company and building expansion for several departments: lighting, ventilation and motion-economy principles being stressed.

Shortage of skilled labor in tool and die shops, as reported earlier, is now relieved by the passing of the peak in this industry. A similar shortage is now being felt, however, in the production-tool shops. Mechanics having suitable experience for work in either type of shop balk at going to the production-tool shops where lower wage rates prevail. Skilled grinders, for example, make over one dollar per hour in die shops and are being found unwilling to accept the 75 to 90 cents per hour paid in the production of cutters.

The tool-supply industry will feel the completion within 60 days of a plant by Ford for the production of twist drills. That company already produces gages and 90 per cent of the taps it uses.

Industrial Review

• So far as the machine tool industry is concerned Cleveland and the Machine Tool Show have been the rallying points during the past fortnight. Almost all of the builders were there as exhibitors, of course, and the dealers were quite as well represented. Their annual meeting, in fact, was the largest they have ever held. But the important fact of this impressive exhibition was that the customers were there in unexpectedly large numbers. Furthermore, they came to buy or to decide what to buy, and not just to look.

• This show has been unique in the history of machine tool shows in that it did not cause any drop in business during the two or three months immediately preceding its opening. On the contrary July and August both set business records that have not been reached since 1930. Domestic business in July was slightly above domestic business for August, but foreign orders in August were enough larger than those of July to bring the August total several points above the July record.

• Exhibitors at machine tool shows generally look upon them as means of stimulating interest in new models rather than as places where orders are actually taken. At Cleveland, however, several displays were completely sold out, and many machines from others will not be taken back to the factory, but will be delivered to buyers instead. Several would-be purchasers who found it difficult to make up their minds were disappointed when less procrastinating customers stepped in and closed for machines in which they were interested.

• Visitors came from all over the country and as a result prospective business promises to be well distributed. The size of the foreign delegations was something of a surprise, particularly the groups from Russia and Germany. Not many orders are expected from the latter because of the difficulty of arranging payments, but the German visitors expressed keen regrets that they could not take back with them some of the machines they saw.

• Inquiries taken at the show will give salesmen plenty of work to do for many months to come. One salesman at one exhibit has more than 40 inquiries on one size of one model alone. All in all, the show exceeded the hopes of its sponsors and future business prospects for the machine tool industry are very bright.

Chicago Machinery Club Occupies New Quarters

Recently reorganized, the Machinery Club of Chicago is now located in its new club rooms on the southeast corner of Jefferson St. and Washington Blvd. The official opening was held on the evening of September 5. The new accommodations include dining room, kitchen, lounging rooms, recreation room and other conveniences for the machinery men. H. H. Brettman, secretary and treasurer, N. A. Strand & Co., is president of the club.

PERSONALS

HAROLD L. BLOOD, formerly of the Ternstedt division of General Motors, is again with the Heald Machine Co. Mr. Blood joined Heald a number of years ago on leaving the Hawthorne Works of the Western Electric Co. In 1932 he left to go with Ternstedt.

FREDERICK H. HUGHES, vice-president of New Departure Mfg. Co., Bristol, Conn., has been elected a director of the Acme Wire Co., New Haven. Mr. Hughes will fill the vacancy caused by the death of ALEXANDER HARPER.

Joins Firth-Sterling

F. W. CURTIS

FRANK CURTIS, formerly of Kearney Trecker Corporation, is now handling Firthite sales for the Firth-Sterling Steel Corporation, McKeesport, Pa.

HENRY BUTLER ALLEN, metallurgist, Henry Disston Co., Philadelphia, Pa., was made a director of the museum of the Franklin Institute, Philadelphia, effective Oct. 1.

WAYNE L. COCKRELL, member of the Publication Committee of the American Society for Metals, has joined the Link Belt Co., Philadelphia.

NELSON J. DARLING, manager of the River Works, General Electric Co., has been appointed manager of the West Lynn plant, also. This post was vacated Sept. 1 with the retirement of F. P. Cox. Mr. Cox was associated with the General Electric Co. for 45 years. N. M. DUCHEMIN, formerly superintendent of the West Lynn works was made assistant manager in charge of operations. W. G. MITCHELL continues as assistant manager in charge of operations at the River Works.

CLYDE L. FREAR, has joined Kelsey-Hayes Wheel Co. as metallurgical engineer. Previously, Mr. Frear, was connected with Eastman Kodak Co.

R. E. W. HARRISON, retiring head of the machinery division of the Bureau of Foreign and Domestic Commerce, has been commissioned a lieutenant commander in the naval reserve.

J. M. MCNEAL, European sales manager in England and Continental Europe for the Landis Machine Co., is visiting the home office at Waynesboro, Pa. While in the United States, Mr. McNeal will attend the National Machine Tool Builders' Exposition at Cleveland.

T. I. PHILLIPS, associated with Westinghouse since 1915, has been appointed general works manager of Westinghouse Electric & Mfg. Co. Mr. Phillips has held various positions of executive responsibility in factories of the company located at Chicopee Falls, Mass., and in the Pittsburgh district. In 1930 he was appointed works manager of the Nuttall plant and in 1933 he was made works manager at East Pittsburgh with additional duties assigned to him. In his new position, Mr. Phillips will serve as central authority for all manufacturing operations of the company.

CHARLES M. REESEY, advertising manager for Cincinnati Milling Machine & Cincinnati Grinders, Inc., was elected president of the Cincinnati Association of Industrial Marketers.

Mr. Reesey is a graduate of the University of Cincinnati. He entered the advertising and sales department of the Cincinnati Milling Machine Co., in 1928, as assistant to the general sales manager. In July 1934 he was appointed advertising manager.

MILES C. SMITH has become connected with Colmonoy, Inc., Los Nietos, Calif., as sales manager.

Exports of Machinery During July, 1935

	July 1935	June 1935	July 1934
Electrical machinery	$45,055,968	$5,891,666	$5,758,896
Power generating machinery (except automotive and electric)	683,136	699,467	618,903
Construction and conveying machinery	1,106,375	793,660	527,993
Mining, well and pumping machinery	2,335,368	2,241,871	2,094,222
Power-driven, metal-working machinery	2,105,069	1,624,579	1,638,865
Other metal-working machinery	153,524	175,930	170,714
Textile machinery	1,422,769	587,528	505,959

Exports of Metal-Working Machinery During July, 1935

	July 1935	June 1935	July 1934
Engine lathes	$105,986	$85,714	$32,374
Turret lathes	49,428	19,893	18,617
Other lathes	99,700	65,631	56,204
Vertical boring mills and chucking machines	115,966	33,730	23,707
Thread cutting and automatic screw machines	90,393	58,851	74,592
Knee and column type milling machines	72,827	75,449	2,898
Other milling machines	175,184	190,612	34,010
Gear cutting machines	181,564	85,805	90,300
Vertical drilling machines	41,877	24,732	7,379
Radial drilling machines	17,175	650	1,202
Other drilling machines	62,445	51,408	99,012
Planers and shapers	67,464	52,293	15,244
Surface grinding machines	31,671	32,662	29,267
External cylindrical grinding machines	49,703	51,526	39,639
Internal grinding machines	51,530	50,715	95,972
Tool grinding, cutter grinding, and universal grinding machines	72,964	71,003	55,773
Other metal-grinding machines	43,515	47,678	52,641
Sheet and plate metal-working machines	129,762	59,680	130,848
Forging machinery	114,316	47,192	86,113
Rolling mill machinery	284,380	244,963	91,072
Foundry and molding equipment	25,166	37,656	23,021
Other power-driven metal-working machinery and parts	222,053	236,757	578,08

Other Metal-Working Machinery

Pneumatic portable tools	51,300	53,211	61,191
Other portable and hand or foot operated metal-working machines and parts	49,013	49,409	44,106
Chucks for machine tools	18,191	10,724	10,360
Machine operated pipe and thread cutters, stocks, dies, taps and other machine operated cutting tools	25,137	42,808	35,634
Other metal-working machine tools	9,883	19,778	19,423

OBITUARIES

MAURICE I. JOHNSTON, treasurer, the Gisholt Machine Co., Madison, Wis., died recently. He was connected with the foundry department for 30 years.

ANTONI L. BARTON, manager of the New York office of Spaulding Fibre Co., Inc., died September 6. Mr. Barton had been associated with the Spaulding Fibre Company since 1910 and had served as their New York manager since then. He was 49 years old.

NICHOLAS A. DOYLE, 68, president of the American Car & Foundry Co., died in Chicago, Sept. 9. In 1886, Mr. Doyle began his business career as a clerk with the Michigan Car Co., Detroit. His association with that company and its successor, the Michigan Peninsular Car Co., and finally the American Car & Foundry Co., has been continuous. He has been vice-president since 1917.

A. R. Hughes, 73, president of the Warren City Tank & Boiler Co., Warren, Ohio, and a pioneer in the manufacture of railroad tank cars, died Sept. 17.

FORREST DARRELL WENDLING, secretary and treasurer of the State Machinery Co., died. Mr. Wendling was 39 years old. He had been one of the founders of the company, formed about five years ago and previously he was associated with the Vonnegut Machinery Co.

JOHN W. MARSH, 65, president of the Marsh Stencil Machine Co., Bellville, Ill., died recently. Mr. Marsh had been president of the company for 25 years.

WINDSOR MORRIS, president of the Morris Machine Works, Baldwinsville, N. Y., died September 2. He had been president of the company, founded 45 years ago by his father, the late W. FREDERICK MORRIS, for the past 15 years. Mr. Morris was 64 years old.

FRED B. SMITH, New England representative of The Hendey Machine Co. died Aug. 29. He had joined The Hendey Machine Co., in 1884 as a machinist apprentice to become department foreman under Henry J. Hendey, founder of the company. Mr. Smith had been their New England representative for 25 years.

PARVIN F. WRIGHT, 75, for many years secretary-treasurer of the Central Machine Works, Indianapolis, died recently.

J. R. TILLMAN

JOHN R. TILLMAN, assistant to DUDLEY B. BULLARD, vice-president in charge of engineering of the Bullard Company, Bridgeport, Conn., died September 17. Mr. Tillman had been supervisor of engineering at the Bullard Company for almost 30 years until April of this year when he was appointed assistant to Mr. Bullard. He was 52 years old.

WILLIAM H. HUNTER, for the last five years manager of the Chicago office of Pratt & Whitney, died September 14. Mr. Hunter was 48 years old. His business career began 31 years ago, when he joined Dougherty & Bement. He soon became associated with Pratt & Whitney and prior to his appointment in Chicago he had been manager of the Philadelphia office.

MEETINGS

AMERICAN GAS ASSOCIATION. Seventeenth annual convention. Oct. 14-17. Chicago, Ill. Alexander Forward, managing director, 420 Lexington Ave., New York, N. Y.

AMERICAN GEAR MANUFACTURERS ASSOCIATION. Eighteenth semi-annual meeting, Oct. 14-15. The General Brock Hotel, Niagara Falls, Canada. J. C. MCQUISTON, secretary, Penn-Lincoln Hotel, Wilkensburg, Pa.

NATIONAL METAL EXPOSITION. Sept. 30-Oct. 4. International Amphitheater, Chicago, Ill. W. H. EISENMAN, secretary, 7016 Euclid Ave., Cleveland.

SAFETY CONGRESS. Twenty-fourth annual congress and exposition. Oct. 14-18. Kentucky, Brown and Seelbacher Hotels, Louisville, Ky. National Safety Council, 20 N. Wacker Drive, Chicago, Ill.

AMERICAN MANAGEMENT ASSOCIATION. Annual conference. Oct. 9-10. Waldorf-Astoria Hotel, New York, N. Y. Annual meeting. Oct. 23-24. Hotel Waldorf-Astoria, New York. N. Y. Alvin E. Dodd, executive vice-president, 20 Vesey St., New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Aeronautic meeting. Oct. 10-12. Hotel Chase, St. Louis, Mo. E. H. SAGER, secretary, Washington University, St. Louis, Mo.

AMERICAN SOCIETY FOR METALS. Seventeenth annual meeting, Sept. 30-Oct. 4. Palmer House, Chicago, Ill. W. H. EISENMAN, secretary, 7016 Euclid Ave., Chicago.

AMERICAN WELDING SOCIETY. Fall meeting, Sept. 30-Oct. 4. Palmer House, Chicago, Ill. M. M. KELLY, secretary, 33 West 39th St., New York, N. Y.

THE ARMY ORDNANCE ASSOCIATION. Seventeenth annual dinner, Oct. 2. Mayflower Hotel, Washington, D. C., annual meeting, Oct. 3. Aberdeen Proving Ground, Md.

CONNECTICUT TERCENTENARY INDUSTRIAL EXPOSITION. Oct. 2-12. State Armory, Hartford, Conn. JOHN H. Goss, Scovill Mfg. Co., Waterbury, Conn., chairman.

INDUSTRIAL MATERIALS EXHIBIT. Third annual exhibition. Oct. 21-25. Hotel Astor, New York, N. Y.

SOCIETY OF AUTOMOTIVE ENGINEERS. Tractor and Industrial Power Meeting. Oct. 11-12. Palmer House, Chicago. Ill. Annual meeting, Nov. 4. Hotel Commodore, New York, N. Y. J. A. WARNER, secretary, 29 W. 39 St., New York.

WIRE ASSOCIATION. Annual meeting, Sept. 30-Oct. 4. Congress Hotel, Chicago, Ill. RICHARD E. BROWN, secretary, 17 E. 42d St., New York.

BUSINESS ITEMS

Ajax Flexible Coupling Co., has moved its Philadelphia office to 1108 Otis Bldg. V. L. SANDERSON is representative in charge.

American Foundry Equipment Co., 555 Byrkit St., Mishawaka, Ind., has appointed MARTIN H. KIDDER as industrial relations director.

Aluminum Industries, Inc., Cincinnati, has announced the opening of a new office — Suite 1004, Petroleum

Bldg., 616 S. Michigan Ave., Chicago. Newly appointed is R. L. COREY as district sales representative for Indiana, Illinois, Wisconsin, Iowa, Missouri and Minnesota. N. R. PATTERSON, affiliated with Permite for the last year, also will have headquarters in the Chicago office.

A. E. HEROUX who has been associated with the company for three years as district manager of the paint division in Detroit has been made general manager. He succeeds A. B. ANDERSON who resigned recently.

General Manufacturing Co., Detroit, Mich., has appointed The Cleveland Duplex Machinery Co., Penton Bldg., Cleveland, Ohio, as exclusive representative for the sale of their general flexible power presses and shaft straightening attachments in northeastern Ohio.

Foote Gear Works, Inc., 1301 S. Cicero Ave., Cicero, Ill., announces distributors in the following territories:

Washington Engineering Co., Perkins Bldg., Tacoma, Wash., for the state of Washington, west of the Columbia River, and Kemp Machinery Co., Baltimore, Md., for Baltimore, Maryland, District of Columbia, Virginia, northwest of Florida and parts of Georgia and Tennessee.

Carbondale Machine Corporation, Harrison, N. J., recently reorganized as a subsidiary of Worthington Pump and Machinery Corporation, to cover the manufacture and sale of all classes of refrigeration, ice manufacture and air conditioning equipment, has announced the following officers: H. C. RAMSEY, president, H. A. FELDBUSH, vice-president, A. H. BAER, vice-president in charge of sales, A. L. PRENTICE, secretary and treasurer, W. LEHMAN and F. D. TALMAGE, asst. secretaries and asst. treasurers, C. A. PACKARD, comptroller.

Delco Remy Corporation, Bloomfield, N. J., newly established in the plant formerly occupied by the La France Corporation, has announced the following chief personnel: A. L. HOPKINS, general manager, E. E. WARD, asst. manager, R. H. RINGO, chief accountant, E. A. MIRTH, plant engineer and C. A. MILBURN, chief inspector.

New machinery and equipment will be installed in the Muncie plant of the company, to increase the production to 10,000 batteries per day. Promotions there include: R. L. SEABURY, chief engineer, C. A. STANLEY, asst. superintendent and R. H. HAUBURSIN, plant engineer.

Hendey Sales Manager

F. J. McCARTY

The Hendey Machine Co., Torrington has appointed FRANK J. MCCARTY general sales manager. Mr. McCarty has spent his entire business career in the machine-tool industry. He was associated with Rudell Belnap Machinery Co., Montreal, prior to 1928 when he joined the sales department at the Hendey Machine Co.

Industrial Plants Corporation, 90 W. Broadway, New York, N. Y., will sell all machinery and equipment located at The Palmer Steel Co., Williamsett, Mass.

Danly Machine Specialties, Inc., 2110 S. 52 Ave., Chicago, Ill., manufacturers of all types of standard and special die sets and die makers supplies, and sole representative in the mechanical industries of Danly-Smith welding has opened an assembly plant and branch office at 3913 N. Broad St., Philadelphia.

S. R. ANSTEY is in charge of the Philadelphia office.

Wrought Washer Mfg. Co., of Milwaukee, Wis. manufacturers of washers and stampings, is expanding its range of service in California and adjacent territory, through its Los Angeles sales agents, the Western Washer & Mfg. Co. The company is moving into larger quarters at 2111 E. 51 St., Los Angeles, Cal., where new cost-reducing machinery for making washers will be installed and production facilities are being generally enlarged.

Marshall & Huschart Machinery Co., Chicago, has appointed C. M. ROBERTSON as salesman. Mr. Robertson has been connected with the E. L. Essley Machinery Co. for the past several years, and prior to that was the direct representative of the Colburn Machine Tool Co.

S. S. WHITE Dental Mfg. Co. announces that the industrial division has moved its offices to new quarters, 10 E. 40th St., New York, N. Y. GEORGE T. LATIMER is manager of the division.

PATENTS

August 20, 1935

Metal-Working Machinery

Grinding Machine. Harold L. Blood and Alfred P. Burns, Worcester, Mass., assigned to The Heald Machine Co. Patent 2,011,705.

Flash Removing Machine. Henry E. Morton, Muskegon Heights, Mich. Patent 2,011,725.

Machine Tool. Gustaf David Sundstrand, Rockford, Ill., assigned to Sundstrand Machine Tool Co. Patent 2,011,826.

Boring Bar Drive Means. Clarence T. Rottler, Seattle, Wash. Patent 2,011,875.

Wire Rope Making Machine and Method. Charles C. Sunderland, New Brunswick, N. J., assigned to John A. Roebling's Sons Co. Patent 2,012,026.

Grinding Machine. Frederick S. Haas, Cincinnati, and Ralph L. Goetzel, Norwood, Ohio, assigned to Cincinnati Grinders, Inc. Patent 2,012,065.

Milling Machine. Lester F. Nenninger and Hans Ernst, Cincinnati, Ohio, assigned to The Cincinnati Milling Co. Patent 2,012,081.

Machine Tool Apparatus. William L. Schellenbach, Wyoming, Ohio, assigned to The Cincinnati Milling Machine Co. Patent 2,012,083.

Automatic Positioning Mechaniam for Machine Tools. Bernard Sassen, Cincinnati, Ohio. Assigned to The Cincinnati Milling Machine Co. Patent 2,012,249.

Tools and Attachments

Saw-Blade Holder, George J. Blum, Chicago, Ill., assigned to Armstrong-Blum Mfg. Co. Patent 2,011,611.

Clutch for Punch Presses or the Like. Paul R. Hahnemann and Frederick E. Munschauer, Buffalo, N. Y., assigned to Niagara Machine & Tool Works. Patent 2,011,629.

Spiral Broach. Carl J. Halborg, Detroit, Mich., assigned to Colonial Broach Co. Patent 2,011,630.

Valve Seat Resurfacing Tool. Edward O'Malley, Chicago, Ill., assigned to James G. McNeil and Edward W. O'Malley. Patent 2,011,688.

Arc Welding Electrode. Harry S. Blumberg, New York, N. Y., assigned to M. W. Kellogg Co. Patent 2,011,706.

Stock Reel for Automatic Multiple Spindle Screw Machines. Alfred E. Drissner, Cleveland, Ohio, assigned to The National Acme Co. Patent 2,011,712.

Screw Thread Rolling Apparatus. Charles E. Handel, Winterset, Iowa, assigned to Munson Manufacturing Co. Patent 2,011,761.

Riveting Tool. Ernest H. Schaff, Grand Haven, Mich., assigned to William H. Keller, Inc. Patent 2,011,877.

Electric Welding. Thomas F. Birmingham, Hammond, Ind., assigned to The Superheater Co. Patent 2,011,926.

Boring Head. John R. Johnson, Rockford, Ill., assigned to Ingersoll Milling Machine Co. Patent 2,012,047.

Headstock for Machine Tools. Frederick S. Haas and Edgar D. Vancil, Cincinnati, Ohio, assigned to Cincinnati Grinders Inc. Patent 2,012,066.

Chuck Operating Key. Arthur M. Stoner, West Hartford, Conn., assigned to The Jacobs Manufacturing Co. Patent 2,012,147.

Processes

Method of Manufacturing Steel Motors. Bruno Loeffler, Plainfield, N. J., assigned to International Motor Co. Patent 2,011,642.

Arc Welding Method. Alexander Kidd, Hawthorne, N. J., assigned to M. W. Kellogg Co. Patent 2,011,719.

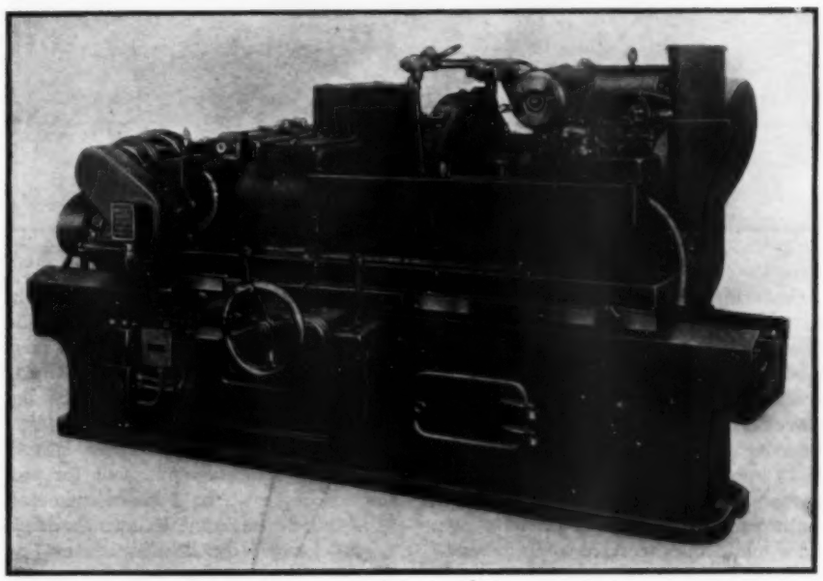
Method of Grinding Worms and Screws. Nikola Trbojevich, Detroit, Mich. Patent 2,011,956.

Method of Forming Rotors. Byvind W. Peterson, Beloit, Wis., assigned to Fairbanks, Morse & Co. Patent 2,012,021.

Art of Grinding. George W. Binns, Cincinnati, Ohio, assigned to Cincinnati Grinders, Inc. Patent 2,012,078.

Shop Equipment NEWS

Landis 5-In. Semi-Automatic Hydraulic Cam Grinders



Built for camshaft grinding, a difficut job because of the irregular shape of the work coupled with a degree of effort required, the 5-in. Type D grinder announced by the Landis Tool Co., Waynesboro, Pa., achieves its accuracy through machine-timed rather than manual-timed operation. The operator is relieved to a degree which enables him to run as many as three or four machines without undue effort.

Six sizes of the 5-in. grinder are available. Actually only two beds and two work carriages are used. A short bed known as the 30-in. may be equipped with either 26- or 30-in. work cradle and swivel table. A long bed known as the 40-in. may be equipped with either 26, 30, 36 or 40-in. work cradle and swivel table.

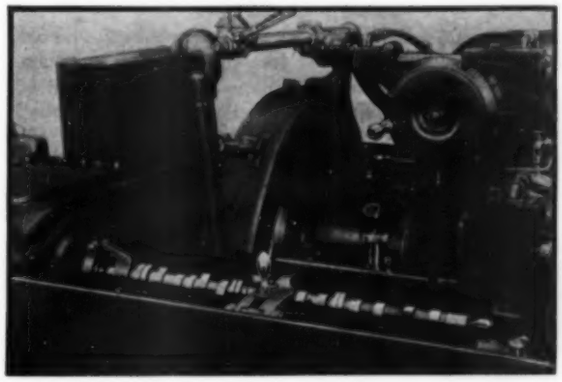
The work bench spindle is powered by a two-speed a.c. motor with a slow-down control. An adjustable-speed motor may be used where d.c. only is available. Power is transmitted to the spindle through a worm, worm gear and multiple V-belts. The work driving fixture is clamped to the end of the live work spindle. Provision is made for timing so that the cams may be ground in perfect relation to the keyway or flange. A cam roller is carried by a shaft in the rear portion of the workhead. Indexing of the roller is accomplished by means of a bronze yoke moved by a roller chain. This chain is driven through gears from a rack attached to the bed, thus securing driving power from the movement of the worktable. Once properly set the roller cannot get out of time.

As with all cam grinders, the size of the roller corresponds to the size of the grinding wheel used in grinding the master cam, and the roller itself is located in the same relation to the master cam as the grinding wheel is to the work. The master cam operating in contact with the cam roller gives the swinging motion to the table as the master revolves. The piston actuated by hydraulic power swings the cradle away from the roller when indexing from one cam to another. Spring tension, cushioned hydraulically, swings the cradle back to grinding position after the indexing has taken place and holds the cradle in this position.

The timing mechanism is driven by a V-belt from a small motor mounted in the rear of the bed. The drive extends forward through the bed to the front where the mechanism itself is located. A worm and worm gear give the necessary speed reduction. The length of the timing cycle may be varied by changing two pick-off gears which are quickly accessible by the removal of a single cover.

Wheel-spindle drive is through multiple V-belts to the end of the spindle from a dynamically balanced motor. A gear on the spindle drives the oil pump for bearing lubrication. A 24-in. diameter grinding wheel is used. There is an oscillating movement to the wheel spindle, the length of the stroke being variable. It may be set anywhere from 0 to ½ in. with 100 oscillations taking place per minute.

Wheel feeding movement is provided by a large feed screw and bronze nut. Feeding-in movement is hydraulically actuated by means of a piston.



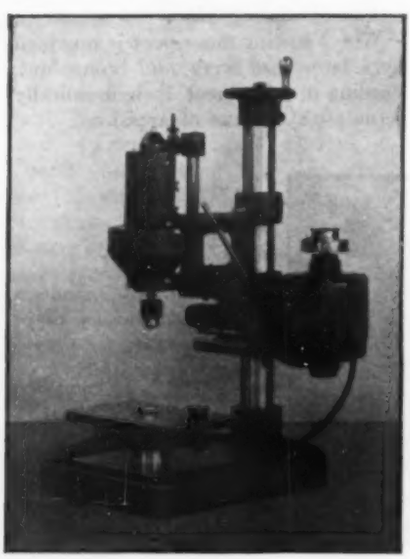
Machine timed operations rather than manual timed are responsible for the accurate results secured on the Landis 5-in. Type D hydraulic cam grinder

Langelier Bench Drilling Machine

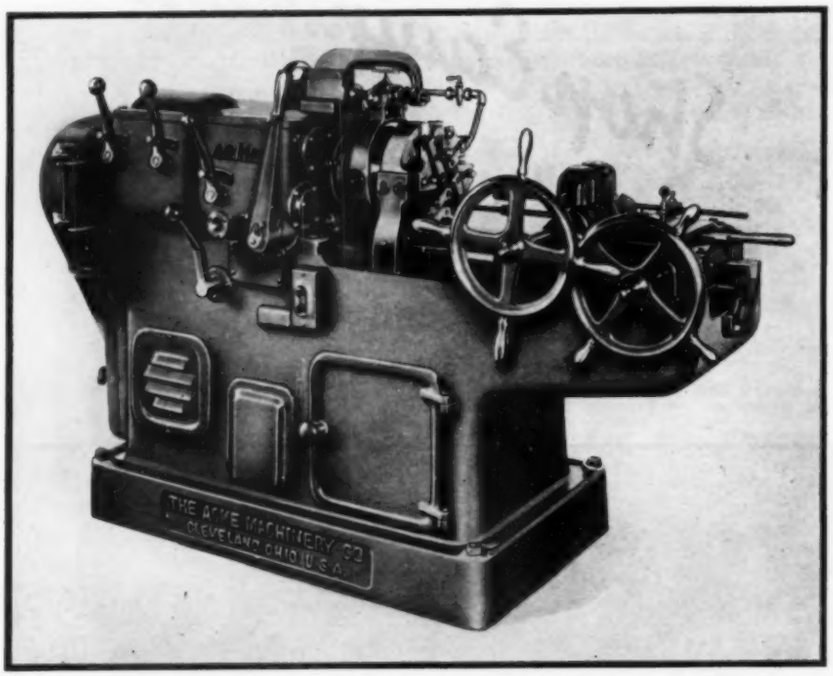
The Langelier Manufacturing Co., Providence, R. I., has added to its line an improved, high-speed, supersensitive bench-drilling machine similar to its Type A machine. This drill is designed with a deeper gap from the chuck to the column, and a new subtable mounted on a trunnion in the center of the base which can be swiveled and clamped in any circular position. It also has a new belt tensioning device. Minimum and maximum speeds from 2,000 to 8,000 r.p.m. can be obtained when equipped with high- or low-speed motors. It has a capacity of ¼ in. in steel.

Vertical adjustment of the head on the column is actuated by a hand wheel at the top of the column which is attached to a ball thrust screw which projects down into the column into a bronze nut attached to the head. The nut has a lateral fit in a long narrow slot cut into the column and acts as a spline to keep the head in line when the clamp is raised or lowered.

Drilling spindle has a sliding fit in a sleeve mounted on two grease-seal ball-bearings housed in two hubs in the head casting and is driven by a broached double-keyed sleeve nut engaging splines in the spindle. This mounting eliminates belt pull on the spindle, and insures an accurate and sensitive feed to the drilling spindle. The spindle feed is actuated by a yoke engaging a small pinion attached to the end of the hand lever hub. It is returned by a torsion spring housed in the hub of the hand feed lever. A radial thrust ball bearing is mounted on the top end of the spindle.



Acme Model 35 Threading Machine



Featuring streamline design, motor drive through V-belt and a special hand wheel adjustment for depth of cut, the Model 35 threading machine developed by the Acme Machinery Company, Cleveland, Ohio, provides conveniences for ease and flexibility of operation. Eight speed changes in geometric progression are provided through a self-contained selective type gearbox. An index plate on the front of the headstock indicates proper position for each lever to obtain desired speed.

Machines can be furnished with either the Acme tangent diehead or the Acme hobbed diehead. The tangent type is particularly suited for production work while the hobbed type is better adapted to frequent changes and short runs. Dieheads are placed close to the main spindle bearing to avoid excessive overhang. It is tripped open automatically at the end of the cut by a cam operated from the carriage.

Either lever or handwheel may be furnished for moving the carriage. With the handwheel movement a double rack and pinion is used which eliminates tendency to cramp the carriage. A specially designed leadscrew with rounded contour on threads permits easy closing of the leadscrew nut. A pitch indicator is furnished on all lead screw machines. Various pitches are obtained through pick-off gears, rigidly mounted outside the headstock.

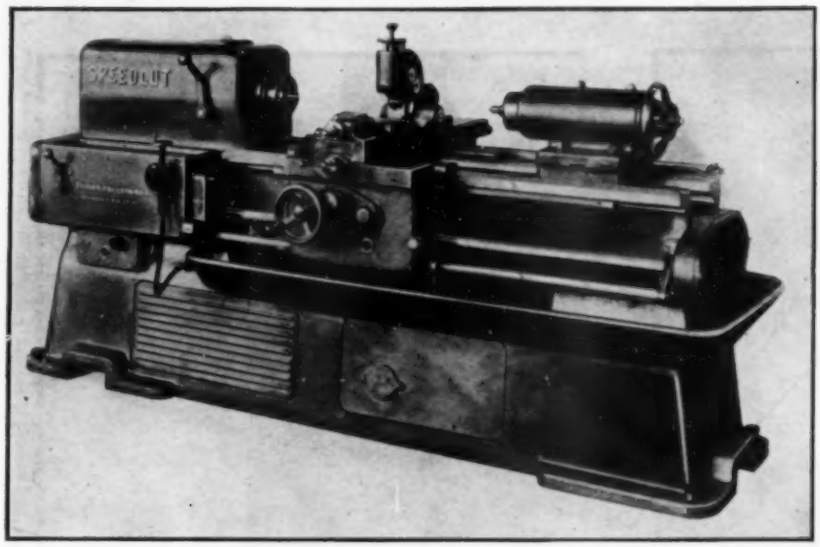
Drive motor is mounted on a hinged plate in the base of the machine, with a single pulley multiple V-belt to main drive. The vise is gibbed to provide adjustment on a cross slide. It also has both vertical and horizontal adjustment for the purpose of maintaining alignment with center line of spindle.

An Acme tangent diehead is furnished as standard equipment for production work up to 2 in. in diameter. It is said to have the following advantages: Longer die life, higher cutting speed, greater chip clearance, ample clearance for cutting point with thread and threads close to shoulders.

Adjustment for controlling diameters can be made through the handwheel without stopping the machine. A graduated scale indicates exact position of the dies. Two hand wheels are furnished on machines equipped with leadscrew attachments. One adjusts for correct diameter, the other for adjustment during roughing.

Leadscrew spindle is driven directly from the main spindle through two gear wheels, thus reducing the lost motion between the dies and the leadscrew. A bronze split nut that engages the leadscrew has its seat in the carriage and is operated by a cam and lever. Leadscrews are suitable for both right and left hand threads of even pitch. Motion of the screw is reversed by moving the slide located in the headstock, so that the right hand gears are disengaged, and the left hand gears engage the driving gear on the main spindle.

Seneca Falls "Speedcut" Lathe



"Speedcut," a lathe constructed by the Seneca Falls Machine Co., Seneca Falls, N. Y., to take full advantage of the possibilities offered by carbide cutting tools, is designed for single point turning or modified multiple tool turning.

The spindle is driven direct through V-belts from either a variable speed motor or a New Departure Transitorq unit. There are no gears on the spindle. Spindle speeds up to 3,600 r.p.m. are available.

The carriage feed mechanism is driven through V-belt to pick-off gears. Three quick changes of feed are available, providing a range of 0.001 to 0.060 in. per revolution of the spindle. The rack and pinion which in turn are operated by an integral spline feed shaft provide the carriage feed.

Speedcut is available with or without rapid traverse and automatic rapid traverse to the carriage. When the machine is furnished without rapid traverse, the carriage is moved to the cutting position and returned by means of the handwheel on the apron. On the plain rapid traverse machine this action is manually controlled by the control lever at the right of the apron. In operating the machine with automatic rapid traverse, the machine is started by lifting the control lever at the right of the apron to its highest position. This starts the main motor and throws in the rapid traverse forward. When the tool reaches the work, the rapid traverse is thrown out and the regular feed automatically picks up. At the end of the cut the tools are automatically withdrawn from the work, the carriage rapid traverses back to the starting point and the main motor is shut off, giving the machine a complete automatic cycle.

The tailstock is of massive construction with built-in revolving spindle. All revolving shafts are mounted on anti-friction bearings. An oil reservoir and pump at the head end of the machine supplies all revolving parts in the head and feed mechanism with oil. A reservoir or pump in the apron supplies all revolving or sliding parts of the apron and carriage with oil.

A form-turning attachment is available which permits the machine to be used for turning straights and tapers from a templet bar. There is also available means to vary the speed of the spindle so that when taper work or work having different diameters is being turned, the spindle speed is changed, automatically maintaining proper speed for each diameter.

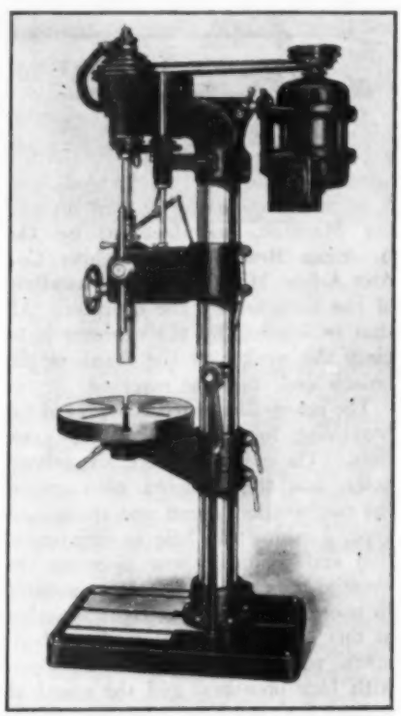
The machine illustrated is equipped with a follow rest, so that the work having straight and taper proportions such as gun barrels may be supported while being turned. This follow rest is so constructed that the rolls automatically support the work regardless of its diameter.

Cutting lubrication is supplied from a reservoir in the pan casting by means of a pump having a capacity of 80 gallons per min. All electrical apparatus and wiring, as well as the coolant pump, is completely enclosed but readily accessible. The Speedcut lathe swings 18 in. over the ways and weighs approximately 6,000 lb.

Buffalo No. 22 Drill

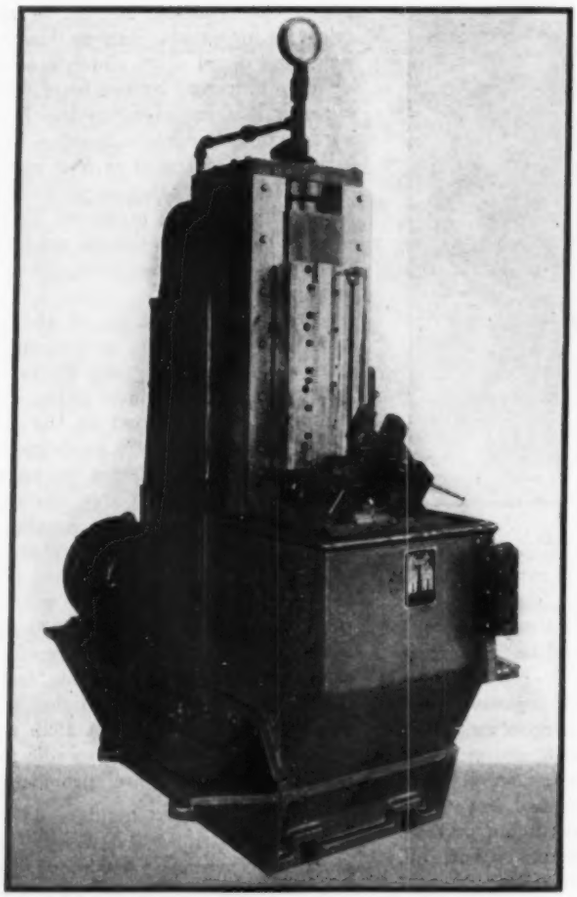
A production tool that may be readily changed between jobs, the "Buffalo" No. 22 drill, produced by the Buffalo Forge Co., Buffalo, N. Y., is made safer for operation because the back gears and direct drive clutch are interlocked and moved by one lever. Shifting may be done while the tool is runing idle or at moderate speeds. Lubrication is concentrated at four pressure gun fittings. All other parts, including all gearing operate in an oil bath or spray. Adjustments can be made conveniently; no loose wrenches are needed.

Correct proportioning of the non-slip V-belt drive and convenience of spindle traverse and feed levers, aids high production. Spindle pulley drives through a clutch direct to the sleeve or through 6 to 1 ratio hardened steel back gearing. Back gears are engaged after the direct clutch is disengaged on a single motion of the handle. In reversing the shift, the gears are disengaged before the direct drive clutch engages. Eight speeds are in geometrical progression from 65 to 1350 r.p.m. This speed range provides for efficient use of drills from $\frac{1}{16}$ to 2 in., and for tapping and spot facing. Higher speeds may be attained with an 1800 r.p.m. motor if the ball bearing spindle sleeve is added. Means are provided for taking up the V-belts.

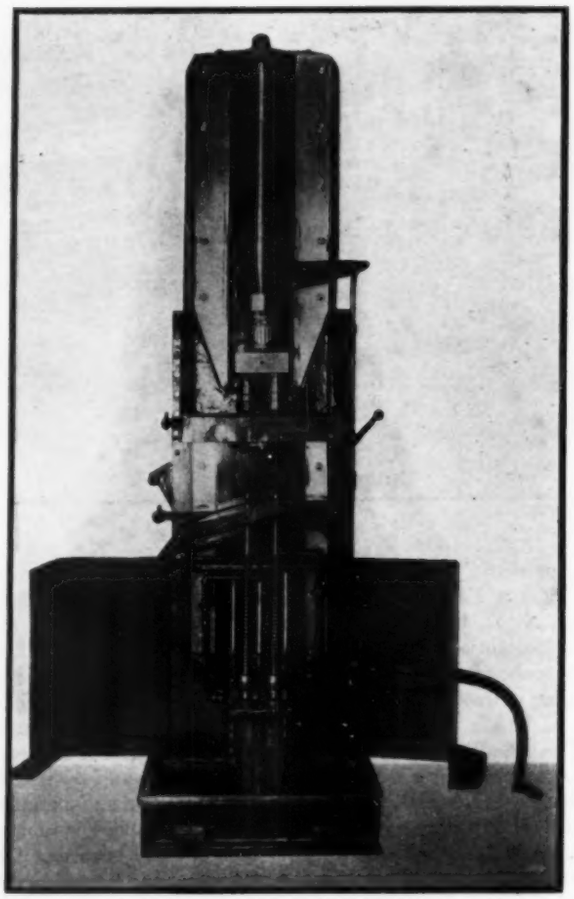


Convenience of set-up is provided by eliminating need for any loose wrenches

American Vertical Broaching Machines



A tilting work holding fixture facilitates loading on the SB-18 surface broaching machine



Production is increased on the V-42 vertical machine by using up to eight broaches at once

Built for pulling the broaches either upward or downward, the American V-42 Semi-Automatic Vertical Broaching Machine, manufactured by the American Broach and Machine Co., Ann Arbor, Mich., eliminates handling of the broaches by the operator. All that is required by the operator is to place the work over the shank of the broach and start the machine.

The set-up illustrated is arranged for broaching four gear blanks at one time. These blanks have six splined holes, and the broaches used are of the combination round and six splined type, finishing the hole in one operation and producing one piece on the average of six seconds. It is possible to operate as many as eight broaches at one time. Installations have been made where machines are equipped with four broaches, and the speed at which the machine operates makes possible a production as high as 2,000 pieces per hour.

Machines are operated by the American hydraulic pressure pump mounted in the rear of the column, submerged in oil. This portion of the column serves as an oil reservoir and avoids the necessity of a lot of exposed pipes, giving clean-cut lines to the machine.

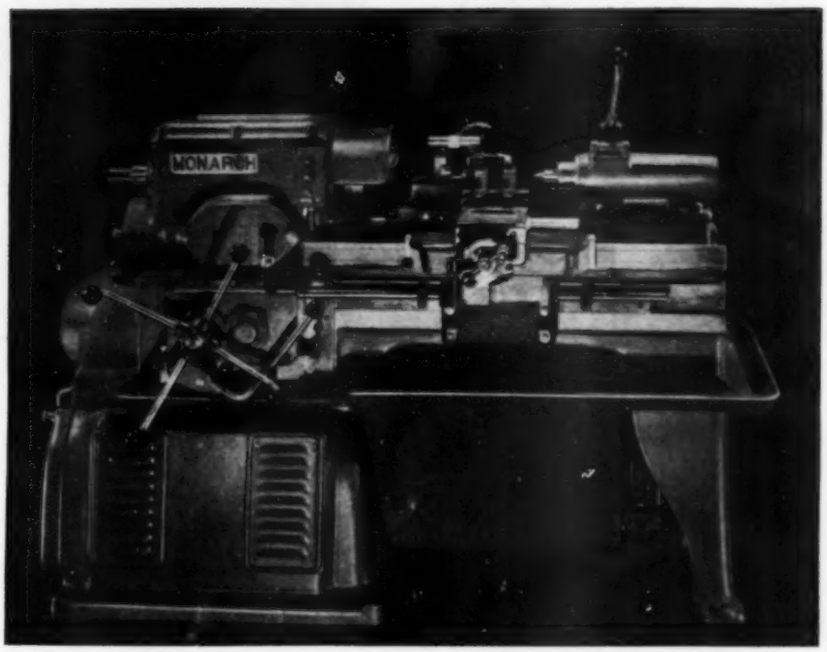
The slide that carries the cross head for pulling the broach consists of the cylinder proper with ways that are cast integral. This is a feature that has an advantage in hydraulic broaching machines, as it provides a mass, the weight of which is a desired feature in the rigidity of the machine.

One or more broaches can be operated at the same time, and when the broach, or broaches, is in position it is placed so that the starting end protrudes slightly through the angular table, enough to permit the operator to place the work on the broach. By applying pressure to the treadle, the lower hydraulic broach elevator raises the broaches automatically connecting them into the pull heads. The main ram is then started on its cutting stroke, pulling the broaches through the work. The maximum length of broach that can be used is 42 in., and the largest diameter of work the machine will receive is 13 in.

The illustration of the company's SB-18 hydraulic surface broaching machine shows the machine equipped with a tilting work holding fixture raised upward ready for loading. Upon starting the machine the fixture automatically closes, and the broaches pass down on the cutting stroke. At the completion of the cutting stroke, the fixture opens for the operator to unload and load while the broach is returning to its up or starting position.

This machine is designed for broaching flat surfaces, concave, racks, ratchets, cams, opposing surfaces and slots. Maximum length of broach used is 18 in.; floor space required 4x6½ ft., net weight 3,400 lb.

Monarch Manufacturing and Shaft-Turning Lathes

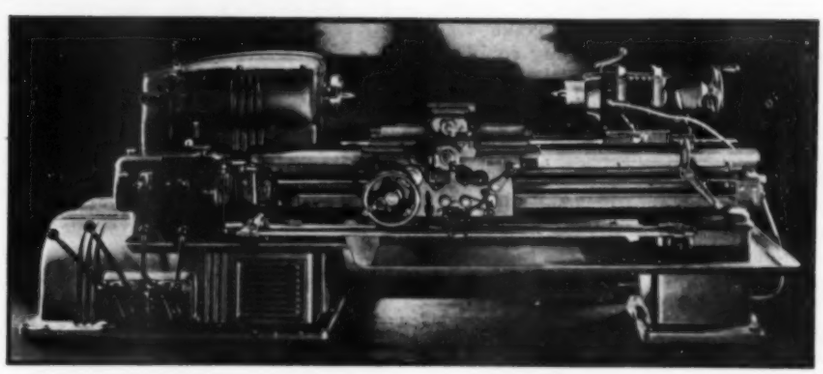


To meet the demand for a high-speed heavy-duty lathe for shaft turning, using cemented carbide tools at spindle speeds as high as 2,000 r.p.m., the Monarch Machine Tool Co., Sidney, Ohio, has developed the 18-in. Model "BB" lathe driven by a 20-hp. motor.

This lathe is the regular standard Monarch 18-in. lathe, except the headstock and the drive. No gears are mounted on the spindle. The geared speed-change unit is mounted inside the cabinet leg and provides sixteen changes of spindle speeds with a normal range of from 50 to 2,000 r.p.m. in geometric progression. This range may be lower or higher as required. Drive is provided from the speed box to the sheave pulley, mounted on the anti-friction bearings and supported inside the headstock with a multiple spline drive to the spindle. The V-belts provide sufficient power to operate the lathe at all speeds without slippage. The spindle is of the flanged type to provide maximum safety in operating at fast speeds. This lathe is equipped with multiple length feed stops, and with the Monarch Micro-gaging method for quickly setting diameters.

Another addition to the Monarch line of manufacturing type lathes is the 12-in. machine illustrated. This lathe is designed to handle the smaller classes of production jobs where a hand return to the front carriage is desirable. It is equipped with automatic length-feed stops, and can be furnished with multiple automatic length-feed stops. Monarch micro-gage method of tool setting, also incorporated in the machine, eliminates "cut and try" in tool set-up.

The lathe is powerful and built to use the cemented carbide tools. It is simple in design. It can be furnished with special tooling to perform a wide variety of single- and multiple-tool manufacturing operations. It may be equipped with either the front carriage or with both the front carriage and the rear facing carriage. The rear facing carriage can be applied to the lathe after shipment.



Left—Semi-automatic Type T manufacturing lathe, designed for smaller classes of production jobs. Below—Model "BB" high-speed, shaft turning lathe

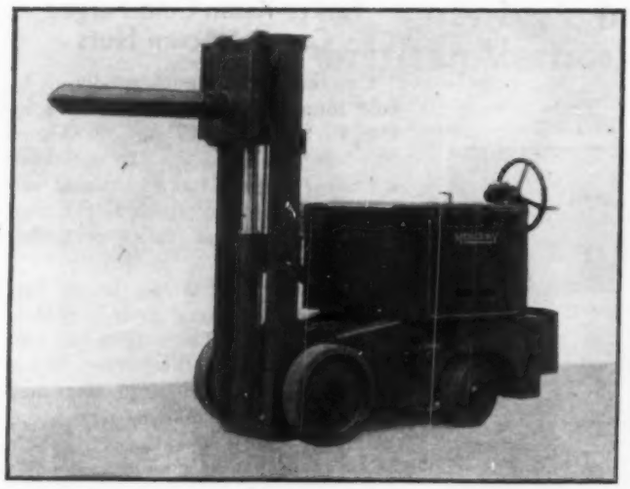
Parker-Kalon Cold-Forged Cap and Acorn Nuts

Cap and acorn nuts produced by cold forging have been announced by the Parker-Kalon Corp., 200 Varick St., New York, N. Y. The nuts have a finish free from tool marks and sufficiently smooth to eliminate the need for polishing before plating or buffing after plating.

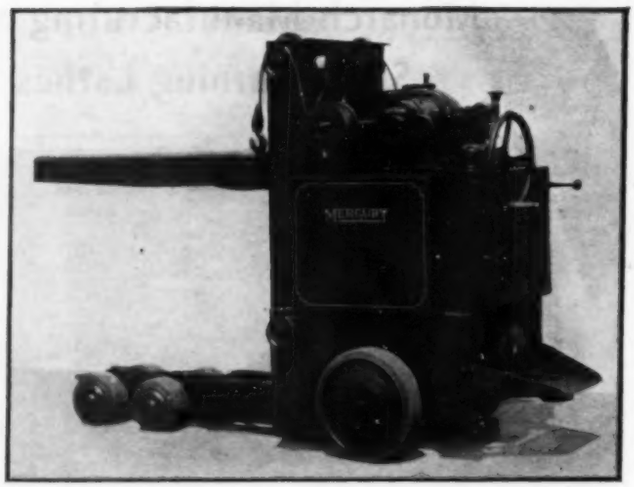
Holes are countersunk before tapping, and the tapping itself is held to close tolerances. The base of the nuts are faced off and the corners chamfered, permitting them to seat flush without danger of marring when using on highly finished surfaces. In the stock finish of natural brass, seven blank sizes are available with standard screw thread sizes from No. 6 to $\frac{5}{8}$ in. Plated finishes can be furnished on order, as well as nuts of aluminum and copper in standard or special threading.

Stop-Off Lacquer for Chromium Plating

The research laboratories of the United Chromium, Inc., 51 East 42nd St., New York, N. Y., have developed a stop-off lacquer, "Unichrome Resist" for use on chromium plating. It is claimed by the engineers of this company that the lacquer possesses the following properties: it is an electrical insulator, resistant to chemical action, flows readily, air-drys quickly, has good adhesive properties, is readily removable by means of a solvent and readily applicable either by brushing, spraying or dipping, when in contact with the chromium plating solution does not yield any products which might contaminate the solution.



Strip steel may be handled on the ram of this truck



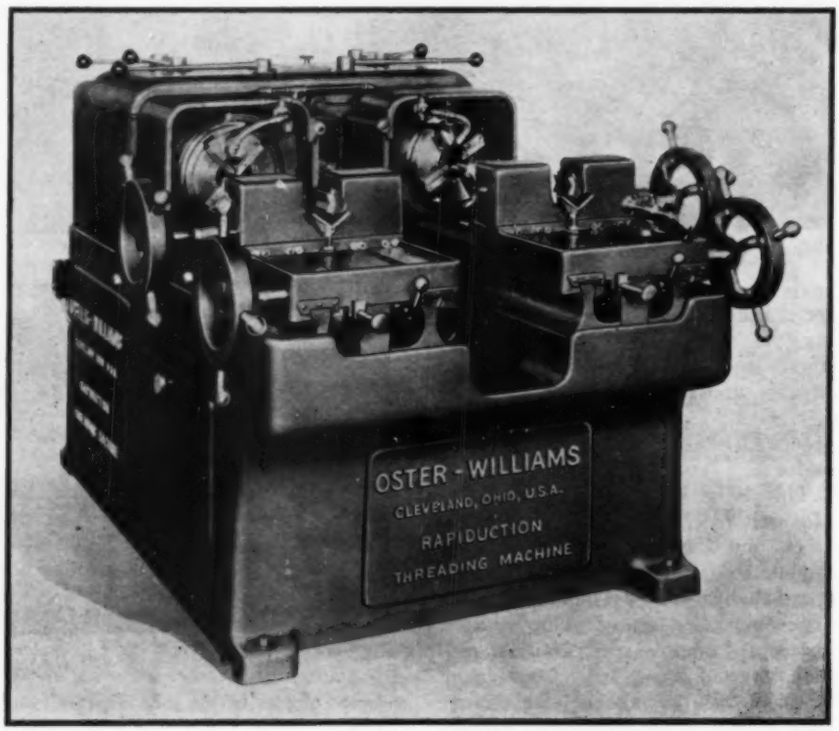
This truck is intended for moving and setting heavy machinery

Mercury Industrial Trucks

Developed by the Mercury Manufacturing Co., 4100 South Halsted St., Chicago, Ill., the "T.T.T." ram truck is a non-tilting, high lift model with Mercury hydraulic lifting action, equipped with a ram for carrying a 4,500 lb. load, handled by inserting the ram in the center of coils. An oversize compartment is provided to accommodate extra battery capacity, giving sustained speeds and permitting continuous operation over long periods.

Other features of construction are: double-reduction bevel and spur gear drive axle, semi-elliptic spring suspension, safety brakes in the wheels, ball bearing mountings throughout, and magnetic contactor control. A heavy steel-plate guard around the operator's platform protects the operation.

Another development by this company is a high-lift industrial truck designed for moving and setting heavy machinery and similar purposes. A double-drum motor-driven winch is mounted above the battery compartment. This winch has a capacity of 4,000 lb. Cable sheaves are provided for convenient handling of any type of equipment to be moved. The clutch has a capacity of 6,000 lb. and is equipped with 4-wheel trailing axle, vertical wheel steering, winch motor controller, and ampere-hour meter mounted above the battery compartment. Design includes the established Mercury features of hydraulic lift, double-reduction bevel and spur gear drive axle, magnetic contactor control, safety brakes in the wheels, semi-elliptic spring suspension and positive automatic overload protection. Both of these trucks are heavily constructed and intended to stand up under the strain of severe usage.

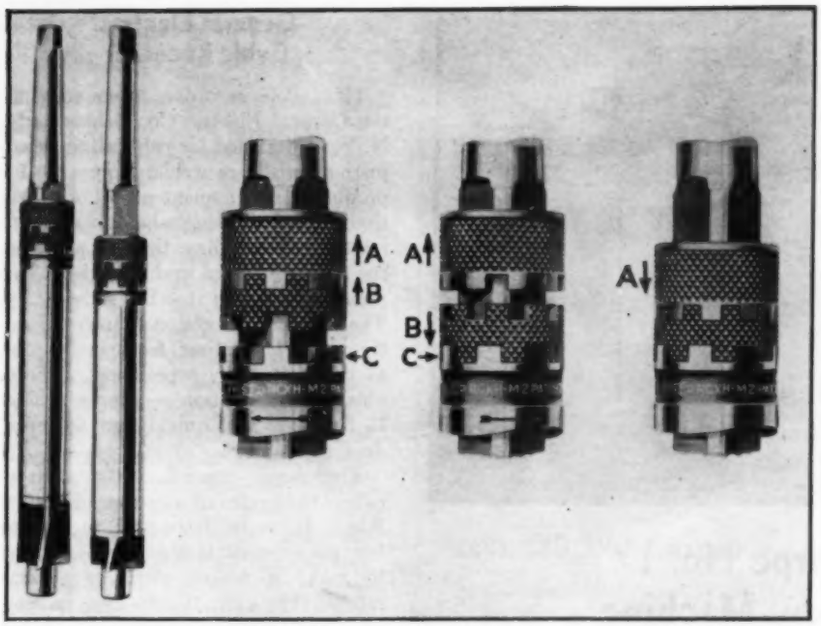


Oster-Williams No. 922 Bolt Machine

Covering all sizes from ½ to 2¼ in. at spindle speeds ranging from 32 to 196 r.p.m., the No. 922 bolt machine announced by Oster-Williams, 2057 East 61st Place, Cleveland, Ohio, is built in both single and double spindle types, for high production on standard runs in bolt plants and for increased production on an extremely wide variety of special work. The spindle bore of 3¼ in. and a vise adaptable to many different types of work holders, gives it practically unlimited possibilities for work of special nature.

The double-spindle machine is equipped with a mechanical reverse on one spindle, so that both right- and left-hand threads can be cut simultaneously. Spindles are mounted on preloaded tapered roller bearings which are adjustable for wear. Vise carriages are semi-steel, rigidly supported with both lateral and vertical adjustments.

Net weight of the double-spindle machine with motor and electrical equipment is 6,000 lb. Its over-all dimensions are: height, 48 in.; width, 55½ in.; length, 84 in. The single spindle model weighs 4,500 lb., with over-all dimensions as follows: height, 48 in.; width, 40 in.; length, 84 in.



Eclipse Variable Length Holder

Variable length holders, made by the Eclipse Counterbore Co., 7410-30 St. Aubin Ave., Detroit, Mich., are especially adapted for multiple spindle operations when several holes are to be faced, counterbored or countersunk to identical depths. They eliminate the necessity of maintaining cutters sharpened in sets of the same exact length.

The 0.001 in. adjustment is accomplished by a compensating collar with driving lugs at both ends. The number of lugs on the upper end differs from the number of lugs on the lower end, which engages the holder body.

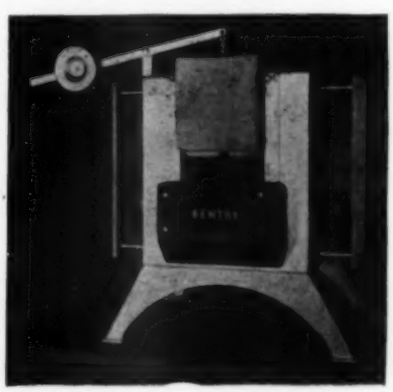
Adjustment is made as follows: raise collars *A* and *B* together and turn *C* ahead one notch, lower *B* and turn *B* and *C* back one notch and then lower *A* into the locked position.

Sentry High Speed Steel Hardening Furnace

Quality hardening is readily obtained in the Model "Y" electric furnace, announced by the Sentry Co., Foxboro, Mass., and for quantity production several of these furnaces can be used with increased flexibility of operation. This furnace is well suited to the Sentry diamond block method of hardening.

Heating elements above and below the muffle assure uniform furnace temperatures. Normal heating element life is 800 hours. Operating temperatures up to 2,500 F. are available. Air cooled terminals eliminate the cooling system and the service attention required by water-cooled terminals. Terminals and all electrical contacts are shielded.

The furnace is made up of a steel shell suitably insulated for high temperature operation. For bench mounting, the hearth is 15½ in. above the top of the bench. Pedestal mounted furnaces with the hearth 43½ in. above the floor are also supplied. When equipped with reasonably new heating elements, the furnace will heat from cold to 2350 F. in less than an hour. Normal operating consumption is 2¾ to 5½ kilowatts, maximum rating being 10 kilowatts. Furnaces are supplied for use with 110 or 220 volts. The furnace can be supplied with any standard control or connected to suitable available control equipment. Overall dimensions of the furnace, not including door lever are: 24 in. wide, 22 in. deep, 25½ in. high. Weight is approximately 300 lb.

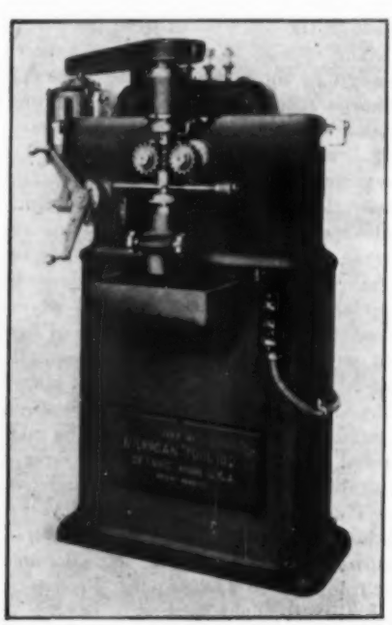


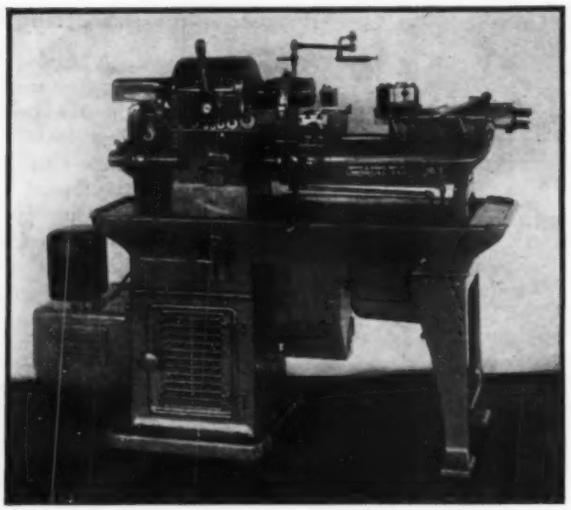
Steering Gear Worm Lapper

A lapping machine for finishing steering gear worms has been introduced by the Michigan Tool Co., Detroit, Mich. Features of the machine include automatic timing, variable for each side of the thread, adjustable center distances allowing recutting of laps, two lap spindles with an adjustable hydraulic brake on each and work running on centers, eliminating adapters and costly tooling. Adjustment of the braking pressure provides a control on the amount of lapping action per revolution, in addition to the adjustment available through the setting of the time cycle.

The cycle itself is adjusted by means of an automatic cut-out relay. A ¾-hp. motor drives the worm, which is mounted on centers, through a belt drive in one direction for a period determined by the setting of the relays. This setting can be adjusted to from 15 sec. to 5 min.

A second relay then cuts in, cutting out the first, reversing the motor and lapping the reverse side of the thread. This relay can also be adjusted for a lapping cycle of from 15 sec. to 5 min. Thus, the machine can be adjusted to take care of worms which consistently run better in production on one side of the thread than on the other. Laps can be adjusted for center distance individually, so that when laps are recut they can be put back to work on the same gear by means of this adjustment. The machine is designed to take care of the complete range of steering gear worms in use today, including both straight and hour-glass worms.





Affording simplicity and flexibility of operation, this machine can be set up quickly and cheaply for small quantities of work

Brown & Sharpe No. 1 Wire-Feed Screw Machine

Affording the producer of small job lots of screws, studs and other turned parts a machine of unusual simplicity of control and flexibility of operation, the No. 1 wire feed screw machine, announced by the Brown & Sharpe Mfg. Co., Providenge, R. I., can be quickly and cheaply set up for small quantities of work, for hurry jobs, or for parts subject to frequent change in design, where special tooling is not warranted.

A feature of this machine is the automatic action of the chuck and feeding mechanism, enabling the feeding of the bar to a stop position at the correct moment. The feeding mechanism is automatically placed in operation by movement of the cross-slide as the piece is cut from the bar.

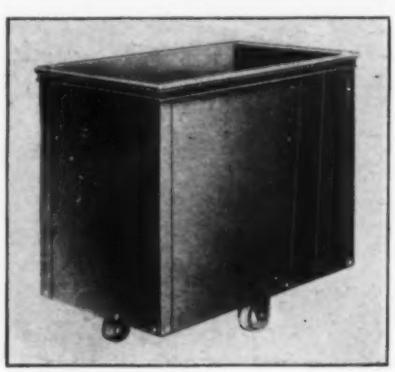
The spindle is of the same general design as those used on the Brown & Sharpe automatic screw machines, and has a clutch body controlled by a convenient hand lever for instantaneous reversal of the spindle on threading operations. Provision of twenty spindle speeds, ten forward and ten reverse, with the changes being made by change gears, permits the machine to perform as efficiently on steel as on free-cutting materials. A ratio of five to one between high and low spindle speeds is advantageous in that it allows the use of the maximum surface speed permitted by the nature of the material being worked and yet assures a suitable surface speed for threading.

This machine has a capacity for studs up to $\frac{5}{8}$ in. in diameter and turns any length to 4 in. Speed range is from 175 to 3,620 r.p.m. Feed tube capacity for light work is $\frac{7}{8}$ in.

The company also makes a No. 0 machine, similar in design but smaller in capacity. The capacity of this machine is $\frac{3}{8}$-in. diameter, turning any length to $2\frac{1}{4}$ in. Speed range is 220 to 4,500 r.p.m. Feed tube capacity for light work is $\frac{5}{8}$ in. Both machines may be supplied with additional equipment for increased capacity.

Stackbin Steel Box Truck

The size of the standard box truck, announced by the Stackbin Corporation, P. O. 940, Providence, R. I., is 33-in. wide, 19-in. long and 23-in. deep, inside dimensions. It is constructed of 20-gage steel, sides and ends. Bottom is made of 18-gage sheet steel securely welded into the truck. Heavy gage steel channel is used for the chassis frame, on which are mounted the casters, two 3-in. swivels and two 4-in. stationary. The chassis is securely bolted into the under side of the truck, thus eliminating rivets and bolts on the inside of the truck. Finish is battleship gray synthetic enamel.



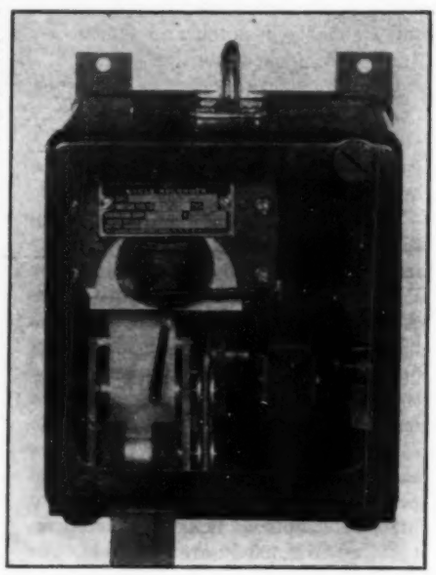
General Electric Cycle Recorder

This cycle recorder, announced by the General Electric Co., Schenectady, N. Y., is designed for calibrating or adjusting resistance welder timers, or for producing a permanent record of a weld time. By indicating when an accurate resetting of welding time is attained, the device is useful in duplicating welds previously found to be satisfactory. The instrument not only records optimum welding time for specific jobs, as determined by experiment, but enables the production welding machines to be easily and quickly set to reproduce this time.

The device records, on a strip of paper, the cycles of duration of current flow. It is oscillographic in nature, but no attempt is made in its design to make it follow wave form accurately. The unit, $5\frac{1}{2}$x$7\frac{1}{2}$x$7\frac{1}{2}$ in., contains a frequency-responsive element, marking mechanism, paper-tape drive and paper-tape supply.

The frequency-responsive element is a polarized reed driven by a coil which surrounds it. This driving coil is tapped for use at either one or five amperes, although a 110-volt coil can be obtained if desired.

The recording device is inkless. A stylus carried by the vibrating reed presses lightly on a moving strip of thin paper under which rotates a graphite roll. The paper is so thin that the record can be read from either side of the strip. A 2,000 ft. roll, one loading for the cycle recorder, is only 5 in. in diameter. Both paper and graphite roller are readily renewed. A small a.c. motor drives both the graphite roll and the recording tape.

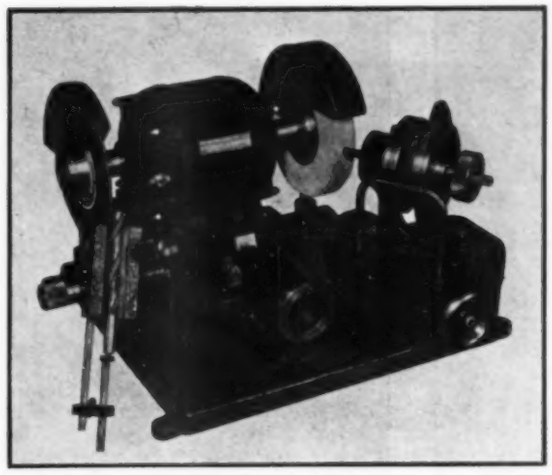


Eisler Welder and Trimmer for Flexible Shafts

Flexible shafts, stranded wire and cables composed of a multiplicity of small wires have a tendency upon being cut to unravel at the ends, making it difficult to join it to other pieces of cable or mechanical parts.

The Eisler Engineering Co., 745 South 13th St., Newark, N. J., has developed a combination cutting, welding and trimming machine upon which flexible cable may be cut apart or two pieces joined and trimmed without unraveling. It is designed to operate on either 110 or 220 volts a.c. and is equipped with a special annealing device, a slide adjustment for closely regulating the welding current and pushbutton control of upset and current. Foot-operated clamping jaws hold the work in position.

A flexible shaft or cable to be cut apart is clamped in the welding jaws. Application of current welds the strands together and finally severs the cable. The ends of the cable are then placed in the trimmer which is equipped with a carborundum wheel, driven by a 1/20-hp. motor and finished off. In welding two ends of a cable together the ends are first prepared as above and then welded together, after which they are placed in the annealer. After proper annealing the cable is inserted in an automatic centering device of the trimmer and the burrs of the joint ground off. Capacity is ¼ in.

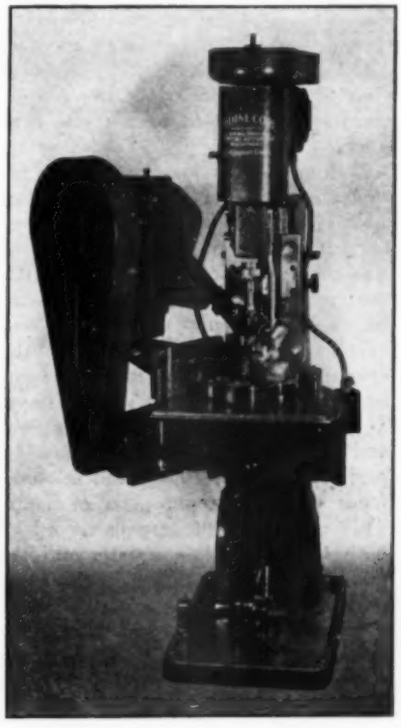


All functions in a drill point may be varied or may be set as the user desires on this machine

Wells 18D Drill Sharpener

Using a principle based upon the hand motion used by the experienced mechanic in sharpening a drill, the 18D drill sharpener, introduced by the Wells Manufacturing Co., Greenfield, Mass., will produce and duplicate any desired shape of point. Drills are sharpened by a full 360-deg. rotating motion which gives equal length of cutting edges of the same angles with the center line of the drill, and identical relief angles at the periphery on both lips, increasing in angle to the center of the drill.

Full adjustment of the angle of presentation to the grinding wheel through a 90 deg. quadrant, makes it possible to sharpen the drill with any included point angle. Any relief angle from 6 to 12 deg. may be obtained. The corners at the periphery of the drill may be removed with this sharpener. By removing these corners, the chip is broken into two parts, the cutting edge is increased, reducing the frictional heat generated, and the corners are less likely to burn. An angle of 130 deg. is established as the average chisel edge angle, and the 18D Sharpener is set for this angle, but it may be increased or decreased to suit particular jobs.



Bodine No. 61 Automatic Screw Inserting Machine

The Bodine Corporation, 1720 Fairfield Ave., Bridgeport, Conn., has placed on the market an automatic screw inserting machine that is adaptable to a wide variety of work. It is equipped with one or more hoppers for the purpose of feeding the screws to the screw driver spindles. These hoppers are individually motor driven, permitting flexibility of location. The hopper feeds the screw close to the point of insertion, and consequently, time is not wasted by waiting for the screw to drop through a gate to the working position. Screw driver spindles are driven by means of motor and belt and are adjustable for torque on the screw.

The machine is built with either a dial or plain type of knee. The illustration shows the plain knee type machine equipped to drive the two screws in the handle on a drip type coffee pot. One screw is driven per stroke of the treadle.

While the machine has been designed primarily to drive machine screws in sizes up to ¼ in., special attachments accommodate larger sizes.

Ortheo-Stereo camera

Electroplaters' microscope

Bausch & Lomb Microscope, Eyepieces and Camera

The Bausch & Lomb Optical Co., Rochester, N. Y., has introduced four developments, interesting to the metal industries, in the field of optics.

Making it possible for the plater to determine the exact thickness of plates at any desired place, the company's electro-platers microscope, distributed by Hanson-Van Winkle-Munning Co., Matawan, N. J., is rugged in construction and easy to operate. By determining plate thickness at various points on a product, it is possible to rack work in such a way as to secure a more even plate and to materially reduce rejects.

This instrument magnifies to such an extent that a plate 0.001 in. thick appears to be ¼ in. thick. It consists of a monocular microscope stand equipped with both coarse and fine adjustments, an achromatic objective, a Filar micrometer eyepiece, a vertical illuminating unit for lighting the specimen, and a mechanical stage to facilitate locating the specimen in the field of the optical system.

Thickness is measured by adjusting the eyepiece, by means of the drum on the side, until the cross line lies over one boundary of the plate. The reading on the drum is then noted, and by turning the drum the cross line is moved to the other boundary. The number of divisions through which the drum has been moved gives the thickness of the film directly in units of 0.00001 in.

Designed to give an unusually flat field, the Ampliplan eyepiece compensates for the curvature of field common to microscope objectives, by means of a negative lens combination. It is intended only for projection or photomicrography. A special adapter must be substituted for that customarily supplied with microscopes. Ampliplans are classified low, medium and high, and should be used with 16 mm., 8 mm., and all high power dry and oil immersion objectives. Magnifying power is 5X for low, 5.5X for medium, and 6X for high. These magnifications are effective when the ground glass of the camera is 10 in. to the rear end of the Ampliplan adapter. All focusing is done at the ground glass of the camera, since the Ampliplan cannot be used as a visual eyepiece.

Making it easy for the metallurgist to take a direct reading, rather than make a mental comparison between the magnified image and a series of standard photomicrographs or charts, the grain size measuring eyepiece can be employed equally well visually and in photomicrography. To adapt the eyepiece to photomicrography, the eye lens has been fitted in a sliding sleeve. Thus the image of micrometer square and that of the specimen may be projected simultaneously and in sharp focus on the ground glass or plate. This gives a photographic record of both the micrometer square, and the grain size classification as an integral part of the print.

Rendering an object in three dimensional perspective, and supplying the eye with an impression that the ordinary flat photograph cannot achieve, the Ortho-Stereo camera employs the principles of stereoscopy in photography. It will supply pictures that may be observed under the following magnifications: 1X, 1.7X, 3.75X, 6.6X, 11X, and 24X. Change of magnification requires only the substitution of one photographic objective for another, each marked with the magnification at which it will work.

A great handicap in the making of stereo-photographs has been eliminated in this camera. There is no need for transposition of prints in mounting. Both pictures are 70 mm. square, and are automatically transposed and recorded on a singe 5x7-in. plate at the proper separation and orientation. Technique is as simple as making a single photograph. The camera is of the fixed focus type and may be used in either vertical or horizontal position.

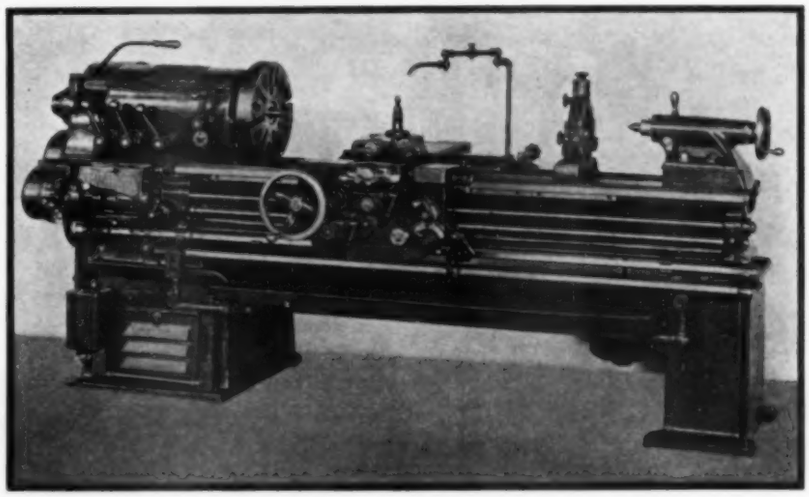
Shaw-Box "Grip Lifter"

Designed to lift anything that will enter its throat, the "Grip Lifter," announced by the Shaw-Box Crane & Hoist Co., Inc., Muskegon, Mich., is available in two sizes, ⅝-in. throat, 5-ton capacity, 1½-in. throat, 10-ton capacity.

The Grip Lifter is attached to the crane hoist by a cable connection through the eye on the top. The lever is pulled downward, lifting the sliding bars and roller on the inclined surface so that the full opening in the throat can be placed over the edge of the column or pile to be handled.

Rough handling will not release the load. The grip cannot be released by a pull on the lever with the load suspended in air, as the pull must exceed the weight of the suspended load. As soon as the load is landed in the desired position, and the weight relieved, a pull on the lever will release it.

Reed-Prentice Model "B" Tool Room Lathe



Equipped with sixteen spindle speeds and 49 changes of feeds and threads the 14-in. precision lathe, recently announced by the Reed-Prentice Corporation, Worcester, Mass., is designed for general tool room application. Speed changes are obtained through sliding gears, mounted on multiple splined shafts and operated by four levers at the front of the headstock. Clutch and brake control for the spindle is operated from both the head end of the lathe and from the apron. Separate clutch control in the apron is provided for longitudinal and cross feeds.

A box-type apron is equipped with an oil pump providing lubrication for all bearings, bed-ways and carriage cross slide. Combined oil pump and splash lubrication is provided to the headstock, with filtration of the oil to the main spindle bearings. Anti-friction construction is used throughout the spindle mounting, quick change gear mechanism and apron. Carriage has bearing on flat of the bed and vertical face with adjustable taper gibs.

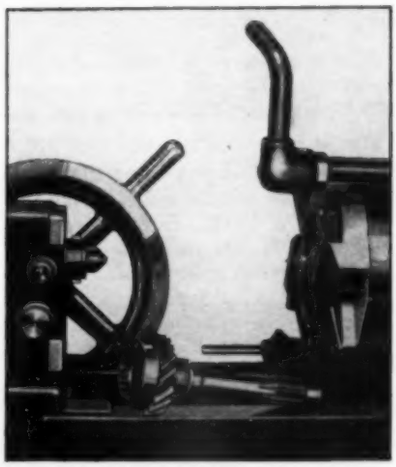
Specifications of the 14-in. lathe are as follows: swing over bed ways, 16½ in.; distance between centers, 30 in.; range of spindle speeds, 18 to 536 r.p.m.; range of threads per inch, 1½ to 96; range of feeds in thousandths per rev., 2½ to 160. Lathes of similar construction are also available in 16,- 18- and 20-in. sizes.

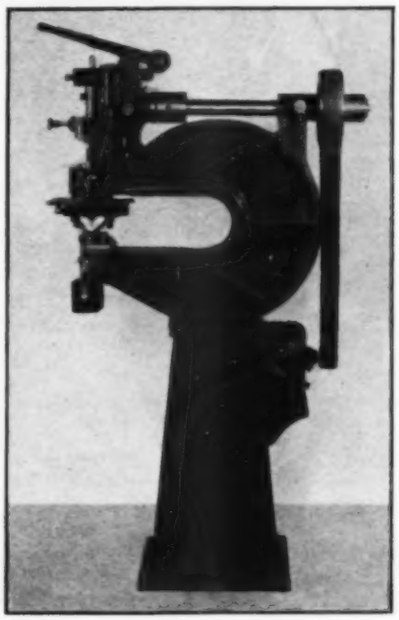
Gray Turret Head Nibbler

Two sizes, one an 18-in. throat, ¼-in. capacity, and one 24-in. throat, ⅜-in. capacity, of turret head nibbling machines, have been announced by the Gray Machine Co., Box 596, Philadelphia, Pa.

A feature of this machine is the overcoming of lost motion in the strippers, doing away with chatter and vibration and enabling the operator to follow layouts more easily. This improvement consists of a weighted screw, adjustable so that the weight can be kept just past the center when the screw is tight against the shank of the strippers. Any vibration due to impact of the cutting tool tightens this screw against the shank, making it impossible for the screw to work loose. This design eliminates necessity for locknuts.

A reservoir for cutting oils is channeled and leads directly to the cutting tool. Oil has direct passage to the cutting tool, regardless of the position the turret head and cutting tool is operating in. The turret head operates in either direction at 180 deg.





Work Holding Device for Landmaco Threading Machine

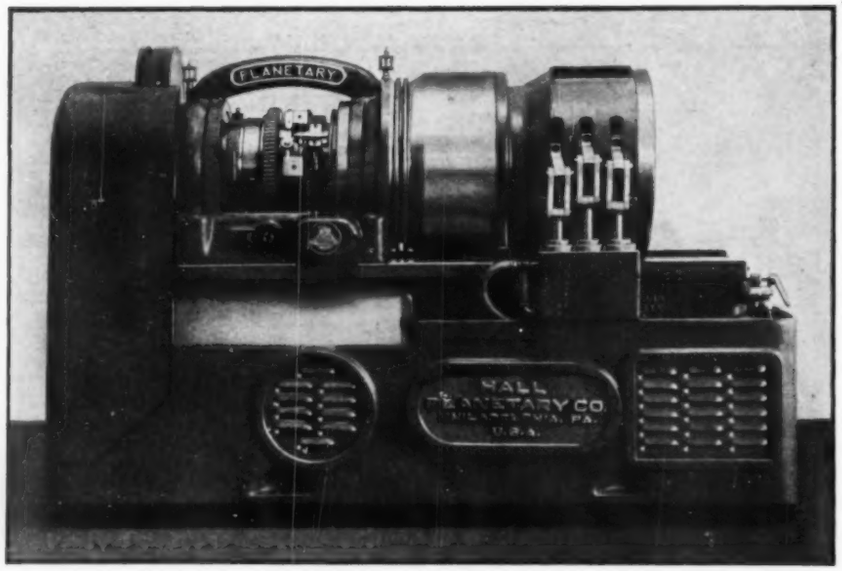
The Landis Machine Co., Waynesboro, Pa., has developed a work holding attachment for use on the Landmaco threading machines. The illustration shows this attachment arranged for holding automobile clutch gears for the threading operation.

On this particular job it was necessary that the thread be concentric with the gear. In order to maintain this concentricity the arrangement also included a live center, supported in the die head. The gears are not rigidly clamped for the threading operation, but are placed by hand over the mandrel. They are driven by lugs on the mandrel engaging with the internal gear. The driving mandrel has a hardened and ground locating surface which serves to properly line up the gear for the threading operation.

Extending slightly beyond the face of the die head, the live center is placed under spring pressure so that as the operator moves the carriage forward in order to bring the gear to be threaded adjacent to the chasers, the center moves back into the bore of the head.

The work holding and driving mandrel is applied to a standard carriage front or vise on the Landmaco machine, so that it can be applied readily or removed if the machine is to be used for regular threading work. The live center in the die head and machine spindles are also removable. Modification of the attachment can be supplied for meeting similar operating conditions.

Hall Pipe Threading Machine



The pipe threading machine illustrated is a product of the Hall Planetary Co., Philadelphia, Pa. As will be evident from the illustration it is a single-head machine. It is made in three sizes "B," "C" and "D", and was designed to mill threads on pipes to a guaranteed accuracy of 0.0005 in. as to lead over the whole length of the thread, and to mill the taper within the same limits in the length of the thread, which is 3⅜ in. long, 2 to 18 in. diameter. All other size planetaries built by this company are similar in design to its pipe threading Planetary.

Cutters are of the patented button type and produce a large number of threads to a set of the cutter button blades. The thread form on the cutter button is ground to produce the correct angle and the correct form and lead within the limits already mentioned.

A 4-ton chuck holds the pipe and is designed not to distort the pipe. If the pipe is slightly out of round it is held in that shape and the threads are milled on it in such fashion that they come from the machine perfectly round. The pump motor for driving the hydraulic pump which actuates the chuck and all the valves that control it are mounted in the right-hand end of the machine bed. The spindle motor is mounted in the left-hand end of the bed directly under the planetary head.

The large steel ring forging between the head and the chuck completely covers the cutter and the end of the pipe which is to be threaded. The oil cylinder which moves the chuck also locks it to the head of the planetary. The chuck can be removed in five seconds.

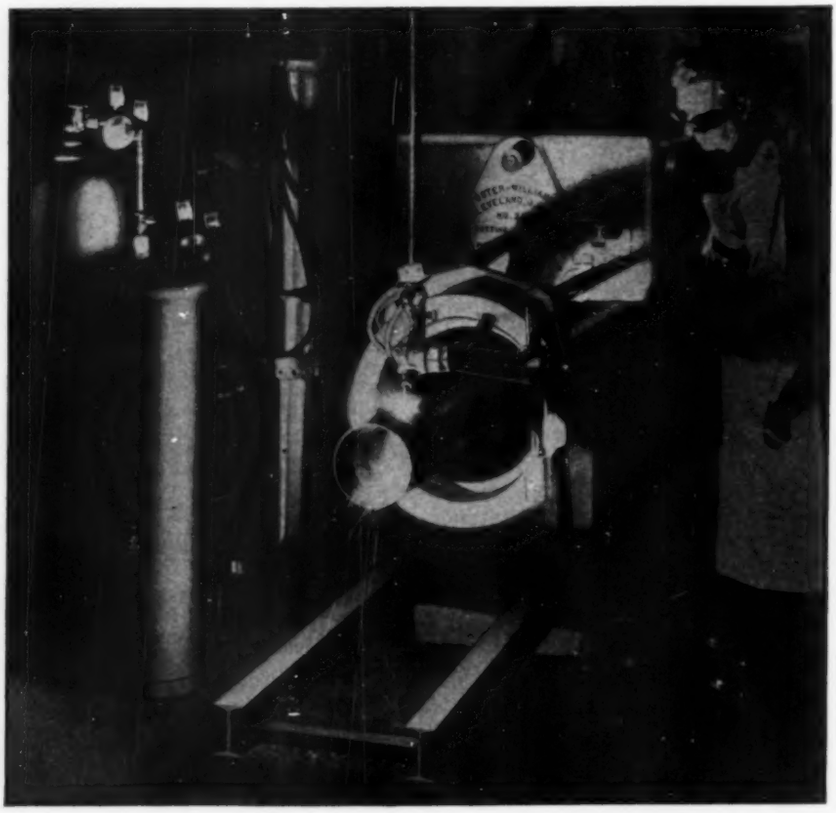
A new method of putting the cutter head on the spindle makes it possible to install a 500-lb. cutter head in 3 min. and to remove one in 2 min.

Oster-Williams Pipe Cutting Machine

Great stress is laid on the correct preparation of pipe for welding. This preparation usually consists of cutting off and beveling the end of the pipe and cutting and beveling the size and shape hole in the side of the pipe, so that, when the two pieces are brought together, they make a snug intersection which can be properly welded. Oster-Williams, 2057 61st Place, Cleveland, Ohio, have introduced a cutting machine which duplicates in design any pattern which is required to do practically any kind of pipe welding job without using cams, templets or special fixtures. Finished surfaces have the appearance of a lathe tool cut.

The cutting torch is accurately guided by the mechanism which duplicates the motion of a torch held in the operator's hand. It will cut any size of pipe from 2½ to 12 in., making full size T's or reducing T's 90 deg., branch reducing T's 45 deg. to 90 deg., elbow, miters, Y's and blunt bull plugs, as well as hole cutting.

The generating case which is made of aluminum is mounted on a rotating column which can be swung in any direction and readily positioned to the end or side of the pipe for the various cuts. The pipe is placed on ball bearing rollers, housed in adjustable sup-

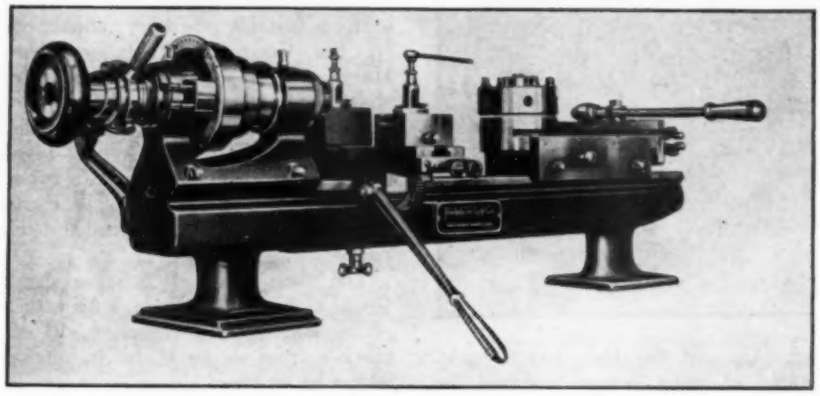


ports resting on double rails mounted on the welded base of the machine.

If the end of the pipe is to be cut off for butt or tee welding, the pipe is placed through the aluminum torch carrier ring. If a hole is to be cut in the side of the pipe, the torch carrier ring is swung around until it faces the side of the pipe. A chart is furnished which guides the operator for any kind of a job. For even the most difficult cut, it is only necessary to make five simple settings.

These settings are regulated by positioning a rotating beam or lever which operates a reciprocating slide. This slide in turn controls the movement of an oscillating lever, which reproduces a reciprocating movement in the torch carrier. The method of imparting movement to the rotating lever is through a hand wheel located at the side of the generating mechanism case. This also produces the drive for rotating the torch carrier ring around the pipe. The operator, viewing progress of cut, can slow or increase the speed of rotation to produce the best results.

Wade Turret Lathe Production Units



By the selection of proper attachments, the bench lathe, announced by the Wade Tool Co., Waltham, Mass., can be used for quantity production. A hand screw machine is made by substituting a turret for the tailstock and a double cross slide for the compound slide rest. For instant action in gripping the stock, a lever closer is fitted to the draw-in spindle. Any one or all of these attachments can be used or taken off and other attachments applied to suit the particular job.

The turret attachment has tool holes $\frac{5}{8}$-in. diameter. Stops index automatically. Working travel is 3 in.; indexing travel is $1\frac{1}{4}$ in. The head may be revolved freely at a certain stage of the indexing movement if it is desired to skip some of the stations.

The double cross slide has a movement of 2 in. and uses standard tool posts or circular form tool holders. It is provided with adjustable stops. A swivel slide is used in place of the front block of the double cross slide for straight or taper turning. This slide has a movement of $2\frac{1}{2}$ in. and uses the standard tool post.

A three bearing head is another production attachment for use where requirements call for close length measurements, exact shoulder or recess dimensions. The collet remains stationary while being closed to grip the stock so that the setting is not disturbed.

A half-open tailstock with a rack of tool spindles is used for a variety of accurate drilling and boring operations. Each spindle with tool all set is rapidly replaced in the half bearings. It is held from turning by a dog which also holds the screw stop for exact depth. Spindles are actuated by lever or by hand as most convenient.

Langelier Swaging Machines

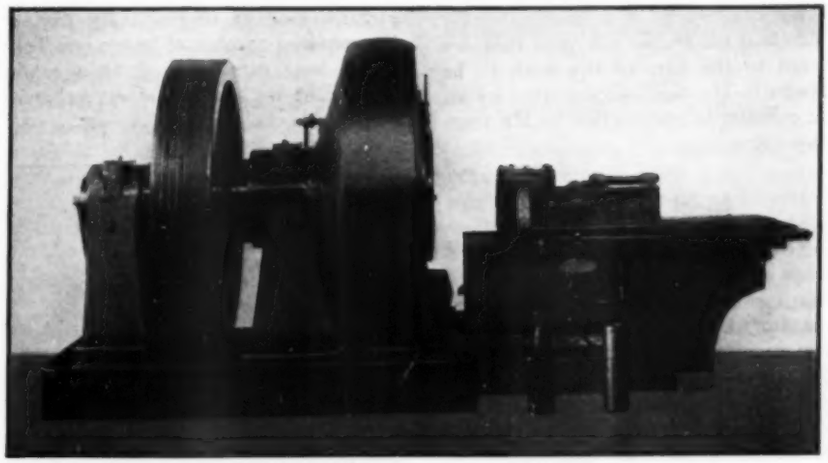
Reduction in the diameter of tungsten wire used in electric light bulbs, by swaging, is accomplished on a machine built by the Langelier Manufacturing Co., Providence, R. I. The wire can be swaged either hot or cold. If swaged hot, a heating furnace can be attached to the front cover of the machine.

A belt-driven roll feed is mounted on a projecting arm at the rear of the flywheel, and is driven by a pulley on the swaging spindle, which indirectly drives the lubricant pump. The feed unit consists of a worm and wheel connecting a shaft and gears to two grooved feeding rolls mounted on two swivel drives, and pressed together by an open helical spring. This unit is adjustable on the arm and the rate of feed is obtained by changing pulleys. A small lever is provided for opening the rolls which are quickly interchangeable.

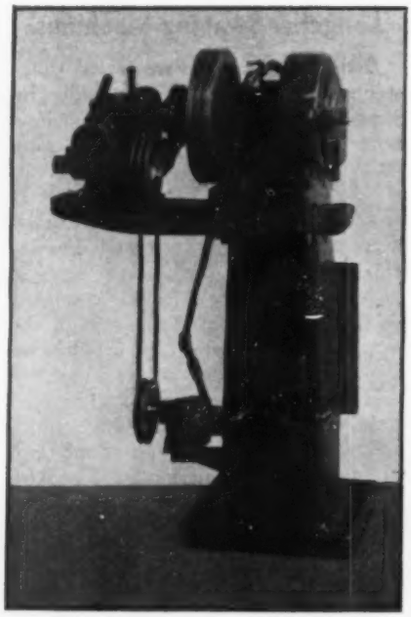
A traveling cage with hardened and ground steel rollers travels inside of a hardened ground ring that is forced into the head. When the spindle revolves, the hammerblocks have striking contact with the cage rolls. Shims are used to obtain the proper squeeze to the dies.

The flywheel is driven through V-belts by a motor bolted to the side of the base. Provision is made to obtain proper belt tension. A gear pump supplies lubricant to the rolls and dies and draws its supply from a reservoir in the base.

The Company's No. "L" swaging machine, which is the largest of its type ever constructed, is capable of tapering or reducing work to a finished diameter of 6 in. The size depends upon the material, whether it is solid or hollow, the length of contour and whether



This swager is capable of reducing work to a finished diameter of 6 in.



This swager reduces light bulb wire

it is swaged in a cold state or heated before swaging.

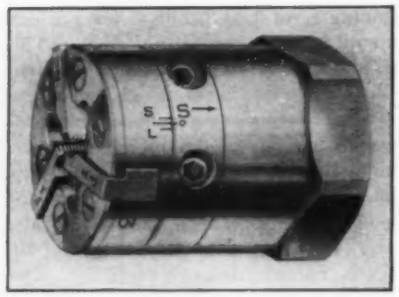
A fixed roll principle of construction is used in the design of the swaging head. Fourteen hardened and ground rolls are equally spaced in a ring around the head end of the spindle, the ring being forced into the head and lock-screwed in place.

Work is fed into the dies by a hydraulically operated holder that is bolted to the front end of the base. It consists of a heavy table sliding on flat ways and is operated by a cylinder mounted in the holder box base. Adjustable dogs bolted in a T-slot in the edge of the table control its working cycle. It has a fast advance, a slow feed, a pause if required, and a rapid return. The operator starts each cycle by a hand lever that is connected to a four-way valve which is piped to the feed cylinder.

Work is gripped by hydraulic, toggle-operated, removable vise-jaws that are bored to the sizes of the work to be swaged. The toggle is actuated by an oil cylinder in conjunction with a four-way valve.

Ideal Tel-Temp

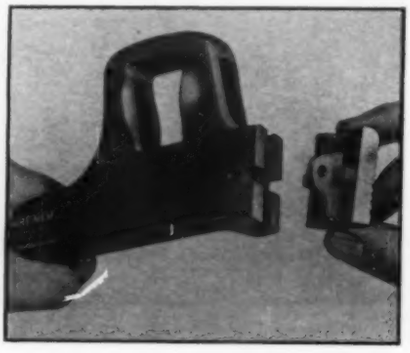
To meet the need for quick determination of temperatures in small motors, bearings and machines, the Ideal Commutator Dresser Co., Sycamore, Ill., has developed the "Ideal Tel-Temp." It consists of a dial plate mounted in a dustproof aluminum case, protected by a non-breakable crystal and chromium-plated cap. The dial gives temperature readings from zero to 100

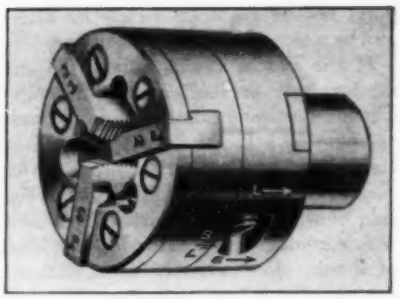


Diehead for the 00G B. & S. machine

deg. C., and the scale has a background of green, orange and red for indicating safe, caution and danger zones. The base has a threaded stud that screws into the case, and is attached to the machine frame with escutcheon pins. To further increase efficiency, the case has a flexible rubber ring that fits tightly against the machine, keeping draughts and outside temperature fluctuations from effecting the true temperature of the machine being tested.

Its separate base construction makes it possible to install the Tel-Temp on machines as a permanent heat indicator or use it for portable testing on any machine or bearing. By having the required number of bases, one Tel-Temp case can be used as a semi-permanent installation on several machines.





Plain shank type diehead

Geometric Dieheads for Light Work

Meeting the demand for a light, removable chaser diehead, the Style EJ2, solid adjustable diehead, announced by the Geometric Tool Co., New Haven, Conn., cuts small diameter short-length threads, which are now being cut with a butt die, spring die, or any solid die of that type. These dieheads are being built in two types, one with a conventional plain shank and the other with a threaded back part.

The plain shank style has a shank ½ in. in diameter, 1½ in. long with a $\frac{3}{32}$ in. bore. These dieheads will cut threads from $\frac{1}{8}$ to ¼ in. in pitches 20 per in. or finer.

The Style EJ2 diehead for the OOG Brown & Sharpe automatic screw threading machine is similar to the plain shank tool with the exception of the back part, which is furnished with a capped hole for application to a threading spindle. This diehead has produced brass screws at the rate of 60 per min. with the die spindle running at 7,000 r.p.m., the work spindle running at 5,000 r.p.m.

Walworth Pipe Wrench

An improved pipe wrench with features said to result in added years of useful service has been announced by the Walworth Co., 60 East 42nd St., New York, N. Y. A renewable lower jaw of hardened steel, with cross tongues seating into cross slots in the handle, is locked in place so as to eliminate backward shear on its pin and prevent loosening in service.

A new type of spring, said to have longer life and easier action, is used. When necessary, it may be replaced without the use of tools. Other features include a more comfortable handgrip, larger capacity in a 10-in. size, reduced weight and narrower jaws in the 24-in. size, a Parkerized rust-proof finish and a cadmium plated nut. The wrench is of drop-forged steel.

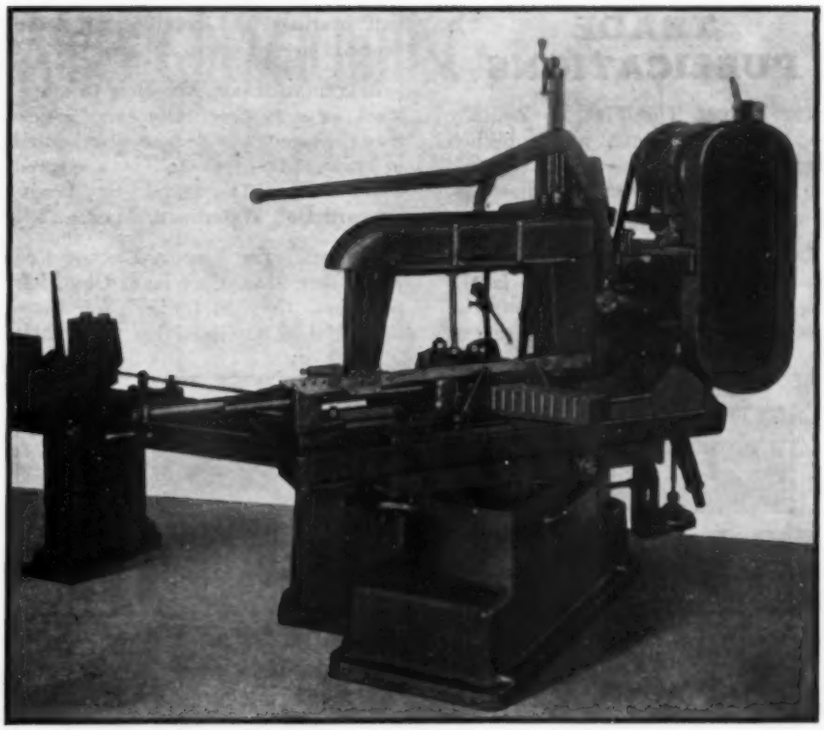
Rasmussen Power Saw

The Rasmussen Machine Co., 1014 Eighth St., Racine, Wis., is building a power saw, the design of which incorporates a number of interesting features. This machine may be operated as a fully automatic unit when employed for cutting off duplicate pieces from bar stock, or it may be set to complete a cut and stop. Either square or angular cuts may be made.

For making angular cuts, the machine is swiveled on its base and set to the required angle as indicated by a graduated dial. The vise on the machine is swiveled, and set to the same angle so that the vise is brought back into line with the stock feed. This feed is furnished with a graduated scale by means of which settings are made for cutting off pieces to the desired length.

When it is desired to cut a specified number of pieces from a bar of stock, a dial mechanism is set to the number of pieces required. As each cut is finished, this dial moves through one space, continuing to do so until the last piece has been cut off. The counting mechanism then trips an electrical switch which stops the machine. When used for duplicate cutting, the machine is set up and started, after which its operation is entirely automatic. The sequence of movements in the complete cycle is as follows: a trip engages the clutch for the stock feeding, causing the feed mechanism to securely grip the bar of stock and move it forward into position for the next cut. The mechanism for operating the stock feed and the remaining functions of the machine are so interlocked that the machine will not feed the saw down unless the stock is advanced to the required position. With the stock in place for a cut, the stock feeding drive is disengaged and the movement of the saw down to the work commences. At this point, a stop on the saw frame is engaged and tightens the vise on the work to be sawed. Feed of the saw is accomplished by means of a rack and pinion, which feeds the saw down a given amount for each revolution of the crank shaft which reciprocates the saw frame and saw.

Designed into this feed mechanism, there is a spring compensating device. The tension of the spring in this compensator can be regulated to adjust the amount of downward pressure of the saw blade on the work, according to the nature of the metal being cut. The saw frame is fed down against the resistance of oil in a dashpot. By opening or closing a by-pass valve in the dashpot, the rapidity with which the saw is fed may be accurately regulated.



The saw cuts on the draw stroke and a cam mechanism lifts the saw clear of the work for each return stroke. As the saw reaches the end of its return stroke, a cam in the feed mechanism returns the saw to the cutting position it had reached on the previous stroke. Another cam then supplements the action of the compensating spring for feeding. When the cut has been completed, the feed is tripped and quick return of the saw engaged. This returns the saw to the starting point, releases the vise and puts the machine into readiness for starting a new cycle of movements.

In addition to the automatic control described this machine may be hand operated. The change from automatic to hand control is accomplished by turning one knob.

When the machine is used automatically, should it happen that the stock is all consumed before the required number of pieces are cut off, an automatic trip stops the machine. The stock feeder automatically provides for cutting off pieces up to 24 in. in length. Should it be desired to cut longer pieces, this is accomplished by adjusting the stop on the stock feeding mechanism to a position which is some convenient fraction of the length of the required piece and then pulling a lever on the machine to cause the stock feed to repeat the required number of times before the cut is started.

Wesson Tool Grinder

An independent, compact, double headed diamond wheel grinding machine, having a two-speed reversible motor with pump and sump inside of the base has been announced by the Wesson Co., 1050 Mt. Elliott Ave., Detroit, Mich.

The grinder is equipped with a safety switch so constructed that the motor must be shut off before reversing. Tables are universal, and the spindle is so constructed that the unit can be removed by loosening three set screws on one side. Weight is 900 lb.

TRADE PUBLICATIONS

JIG BORER. The Pratt & Whitney Co., Hartford, Conn., has published Circular No. 412 describing the No. 2A jig borer. Illustrations show details of construction and operation.

LUBRICATION. "Lubrication of Bearings in Electrical Machinery" is the title of a sheet issued by the Imperial Electric Co., Akron, Ohio. Care of ball bearings and pointers on sleeve bearings are covered.

MATERIAL HANDLING. How to move, stack, or store practically every article manufactured, handled, or warehoused is graphically illustrated in a colored folder, No. 311, issued by Lewis-Shepard Co., Watertown, Mass.

MOTORS. The Lincoln Electric Co., P. O. Box 9758, Cleveland, Ohio, has published the "Motorizer" for those interested in a.c. induction motors. It is a book of questions and answers from men in this field.

TOOL STEEL. The Crucible Steel Co. of America, New York, N. Y., has issued a loose-leaf handbook on tool steels that contains much of the kind of information shop men have wanted, but that has not been generally available heretofore. There are, for example, seven pages which outline the first, second and third choices of steels for a variety of applications from air hammer tools to wrenches, with clutch dogs, gun barrel drills, rivet busters, and many other types of tools in between. In addition there is a large amount of detailed instructions as to the general working of each grade of steel which gives the hardness to be expected in each case. The analysis of each steel is also given in which the percentages of the principal elements are stated.

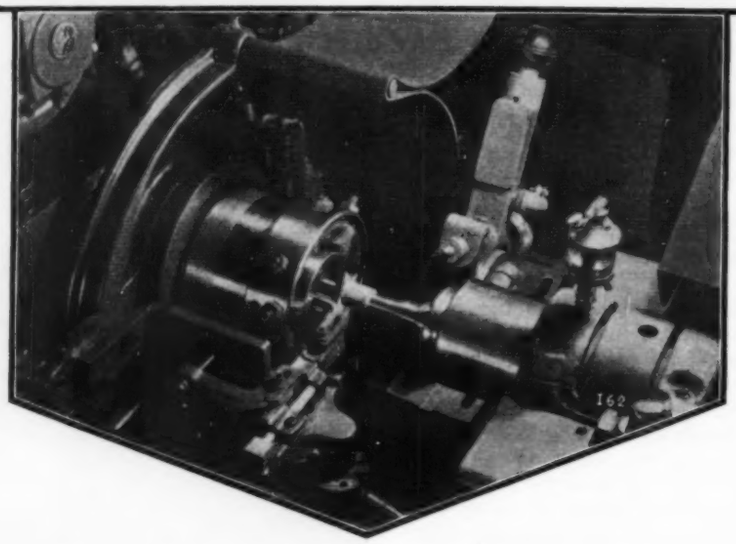
TRANSFORMERS. Circular of the National Bureau of Standards C-408 "Information for the Amateur Designer of Transformers for 25- to 60-cycle Circuits," has been issued by the United States Department of Commerce. It is for sale by the Superintendent of Documents, Washington, D. C. Price 5 cents.

VACATIONS WITH PAY FOR WAGE EARNERS. The National Industrial Conference Board, Inc., 247 Park Ave., New York, N. Y., has published the information obtained by two surveys; one in 1931 and another in 1935, of management practice regarding allowance of "Vacations With Pay for Wage Earners" in industry.

V-BELT DRIVES. The installation and operation of V-belt drives is discussed in a 48-page book on V-Belt engineering published by The Gates Rubber Co., Denver, Colo. A section on the care of V-belt drives outlines an easy way of checking tensions, and discusses the effect on V-belts of oil, water, steam, dust and chemical fumes. Other sections in the book include complete instructions for the design of V-V, quarter-turn, double-V and V-flat drives.

WELDING. "How to Make It Wear Longer by Hard Facing and Overlaying," published by The Lincoln Electric Co., Cleveland, Ohio, contains information on the conditions which cause the breaking down of metallic working surfaces, where hard facing and arc welding can be used to advantage, how to choose the proper electrode for hard facing with arc welding, and notes on the use of Lincoln hard facing electrodes.

THAT'S THE SIZE OF IT



You can be certain it is. The size the drawing called for. Within the limits specified. What's more, each successive piece will be to size with like accuracy.

The reason for all this is the Landis-Solex Sizing Device—an outstanding feature of the new Landis Type C 15″x8″ Hydraulic Internal Grinder. This device is accurate within exceedingly close limits. Automatic in operation of course. May be used for straight or tapered holes, whether open or blind. Is highly flexible, easily set.

There is more about it in your copy of catalog E-35. 193

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